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# Rock Products

CEMENT and ENGINEERING NEWS

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*Well drilling at the quarry of the Valley Forge Cement Co.*

# East's Newest Cement Plant

## Valley Forge Cement Company Has an Operation with Many Unusual and Some Unique Features, Near Philadelphia, Penn.

THE first thing that strikes the visitor to new plant of the Valley Forge Cement Co., West Conshohocken, Penn., is the rugged topography of the plant's site. It is typical Pennsylvania "mountain" scenery on all sides, with the Schuylkill river almost lapping the rocky hillsides in front of the plant, and with the narrow flat between the river bank and the hillside mostly occupied by railway tracks and a public highway. While this topography has given the plant a setting pretty enough to enthuse an artist, it would have discouraged the average cement manufacturer.

The second thing that strikes the visitor is the wide separation of the various units of the plant, uphill and down, as well as horizontally. This is more or less a result of the topography. Until methods of pumping cement, coal and slurry, that have been perfected in the last three or four years, were available such a plant layout as this one would have been a practical impossibility—or at least hardly feasible.

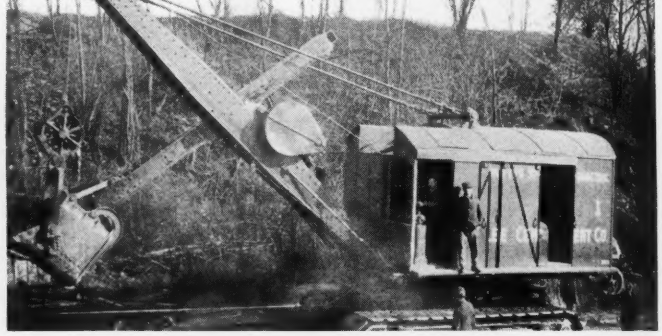
The third thing that strikes the visitor is the character of the raw material—a metamorphosed limestone, which in appearance resembles mica schist more than anything else. While it contains about the same proportions of lime (from 70 to 80% $CaCO_3$), alumina and silica as the natural cement rock of the Lehigh valley, it is not at all similar to it, and according to the Pennsylvania Geological Survey contains many complex mineral compositions. So far as known it is the only deposit of limestone of its kind used to make portland cement. It is of just about the right proportions to make portland cement without admixtures of either limestone or clay, and is ground wet with comparative ease. While this limestone may have had the same origin as the Lehigh rock, it has certainly had a different geological history, and is not only very old but apparently has been sometime subjected to great heat and pressures.

The quarry is about 1000 ft. from the crushing plant, and on the far side of a dividing ridge, so that there is a slight "hump" between. The transportation between the quarry and the crushing plant is by means of a standard gage railway track, graded and maintained in regular railway style, over which 12-ton Vulcan gasoline locomotives pull trains of 6 to 8 Easton, all-steel quarry cars of 8-yd. capacity each.

Stripping is done by contract using 2B Erie steam shovels and motor trucks to move the overburden. Later an 8-ton Plymouth gasoline locomotive, 3-ft. gage, and contractor type dump cars will be used.

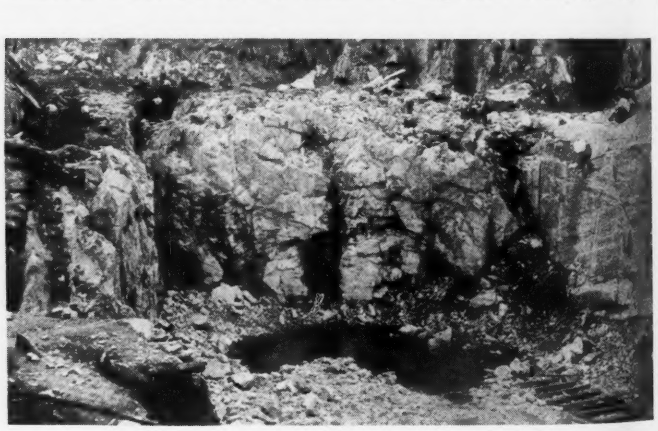
Drilling is done with a Loomis Clipper (electric) well drill, using Ingersoll-Rand Jackhamers for secondary drilling and blasting. Rock loading is done with a No. 37 Marion electric shovel (Ward-Leonard control). The quarry cars are hauled out of the quarry pit by a single-drum Flory hoist powered with a 100-hp., 2200-v., General Electric a.c. motor. Other equipment at the quarry includes a 3A, 9x8 Pennsylvania air compressor (100 cu. ft.) driven by a 30-

*Opening the new quarry of the Valley Forge Cement Co.*

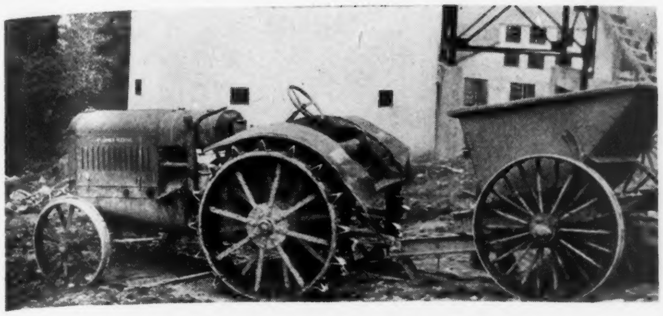


*Electric shovel on crawler treads loading rock in the quarry*

*Well drilling at the deposit. Note the peculiar limestone formation*



*Another view in the quarry further illustrating the unusual formations*



Tractor and trailer used in grading and stripping

Gasoline locomotive and all-steel quarry cars

hp. 440-v. Westinghouse a.c. motor.

A Deering tractor and an Easton 2-wheel dump trailer are used for moving some of the stripping and for grading about the plant.

### Crushing Plant

The quarry cars side-dump individually into an all-steel hopper, on the bottom of which is a 48-in. Traylor apron feeder, driven by a 30-hp. G.-E. induction motor (440-v., 860 r.p.m.) through a D. O. James spur-gear reducer (860 to 91 r.p.m.), a T. B. Woods Sons' flexible coupling and a chain and sprockets. For dumping the cars an air hoist is used, but, contrary to common practice, instead of being suspended vertically, it is attached to an I-beam horizontally over the crusher feeder, and operates the car hook through pulleys and wire rope. The same I-beam carries a 20-ton traveling chain hoist, which serves both crushers and feeders.

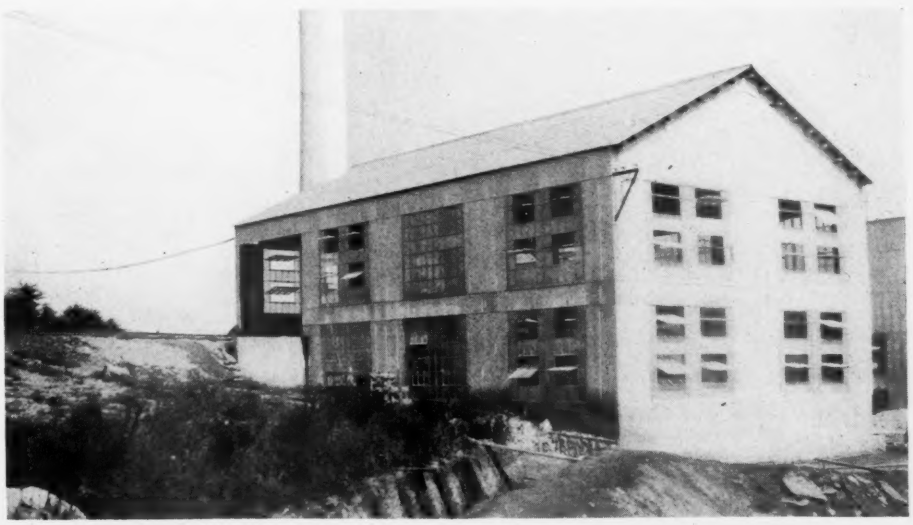
The crusher building is located on a side hill and is stepped down in three levels; the track level, the primary crusher level, which has the transformers (Westinghouse) switches and controls for both crushers and feeders, and the secondary crusher level. The primary crusher is a 48x60-in. Traylor jaw crusher, driven by a 150-hp. 2200-v. G.-E. motor, running at 575 r.p.m. through a 24-in. belt. The primary crusher discharges to an inclined pan feeder to a No. 9 Jumbo Williams hammer mill, direct-connected through a flexible coupling with a 350-hp., 2200-v. G.-E. motor running at 875 r.p.m.

The crushed stone from the hammer mill goes to a 24-in. Stearns belt conveyor, equipped with Timken roller bearings and Alemite lubrication. Owing to the ruggedness of the building site, the conveyor is partly in concrete tunnel and partly in the open. A Norblo dust recovery system has been installed in the crusher house.

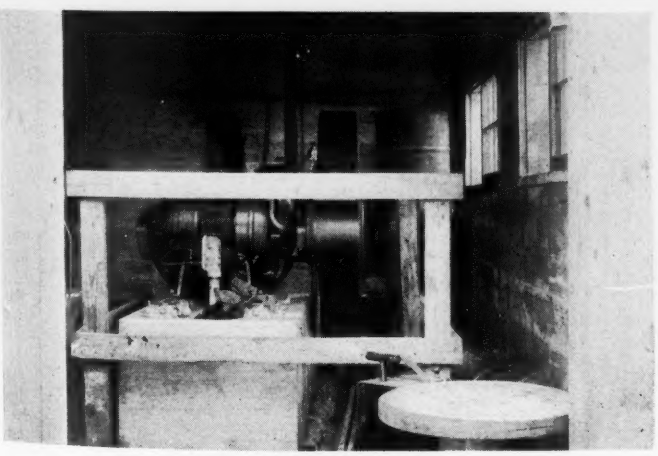
### Storage Building

The storage building is below (and east of) the crusher building and its axis is at right angles to that of the crusher building. The end nearest the crusher building (south) where the stone storage is, was cut out of a rock ledge, as the views show. The kilns building, as will be described later, is on an axis parallel to the crusher building and the clinker is also discharged from the west side near the northern end of the storage building. Gypsum is received on the side opposite (east) in a concrete hopper, as will be described.

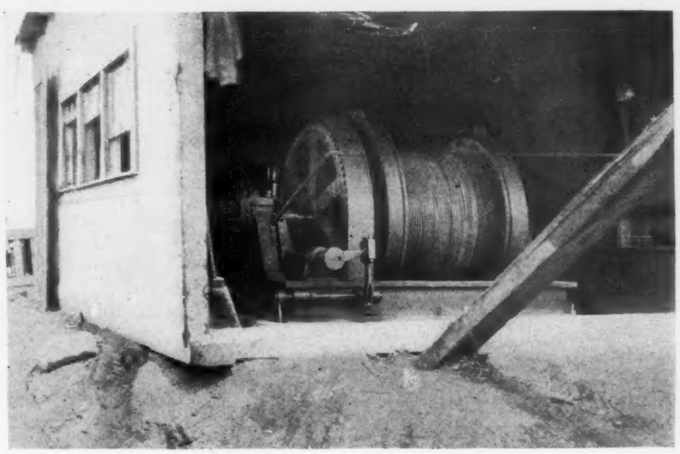
The storage building is 240 ft. long and 80 ft. wide, served by a Harnischfeger overhead, traveling, electric crane of 8 tons capacity. A 3-yd. Blaw-Knox bucket handles the rock, clinker and gypsum from storage to mill feed bins. These bins are of steel construction, and each holds sufficient material for one shift's operation. The concrete retaining walls of the storage building



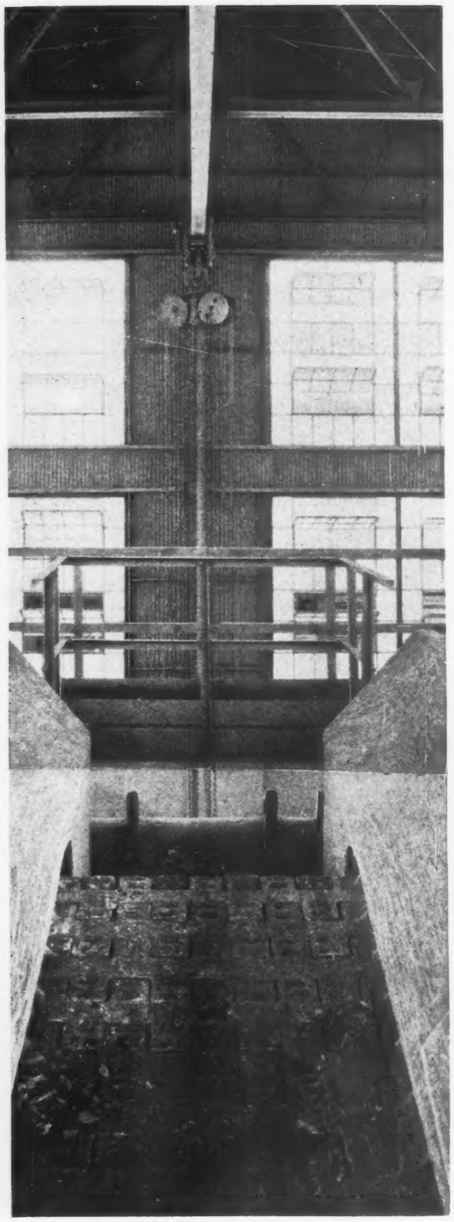
Crusher building from the quarry side—the kiln building shows in the background



Electric-motor driven air compressor for quarry drills



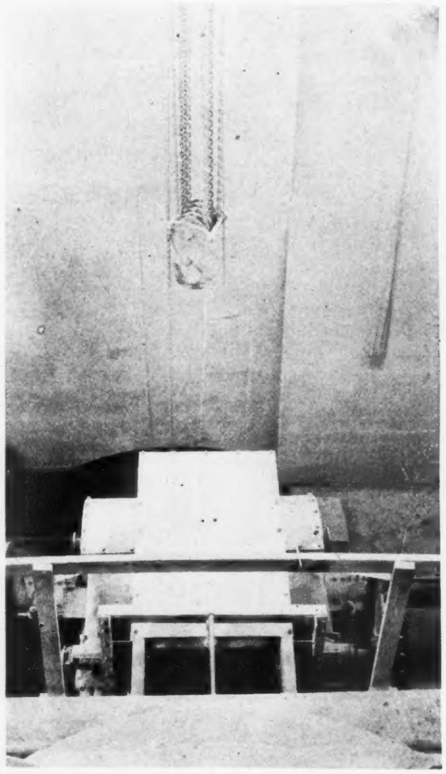
Single-drum electric hoist operating quarry incline



*The pan feeder and initial crusher as seen from the dumping track over the feeder*

are 20 ft. high, and the space provided for stone storage is enough for one month's run of the present plant. Clinker storage also provides for about one month's run.

Provision has been made to receive and crush imported limestone should this ever become necessary. On the east side of the storage building, near the south end, is a steel track hopper (10x12 ft.) to receive limestone, or other raw material such as

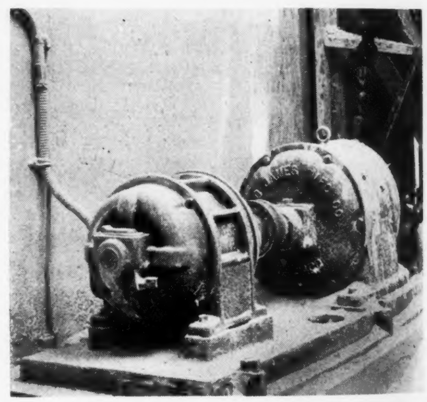


*Looking down on the secondary crusher-hammer mill*

shale. From the track hopper the stone is raised by a 24-in. Latimer pan conveyor to a W-1 Jumbo Williams hammer mill, which discharges to a 24-in. belt conveyor, in turn feeding a 24-in. Latimer bucket elevator to the stone storage. This conveyor also has Stearns idlers, equipped with Timken roller bearings.

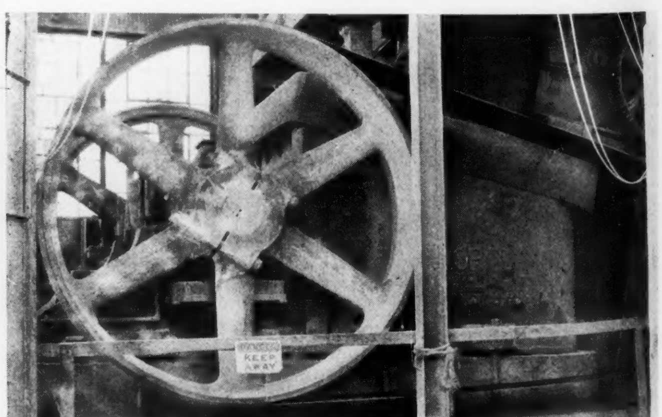
Gypsum is received in box cars on the east side of the storage building, shoveled

*Stone hopper and apron feeder to initial jaw crusher — from the discharge end of the feeder*

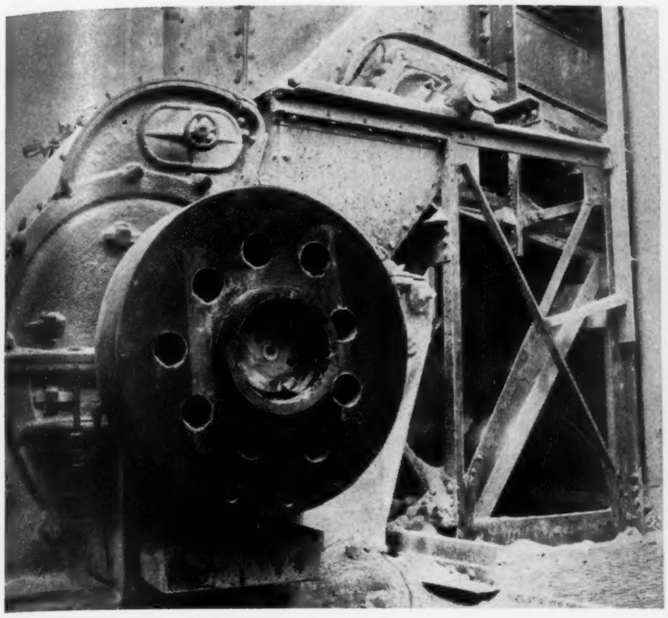


*Drive on apron feeder from primary to secondary crusher*

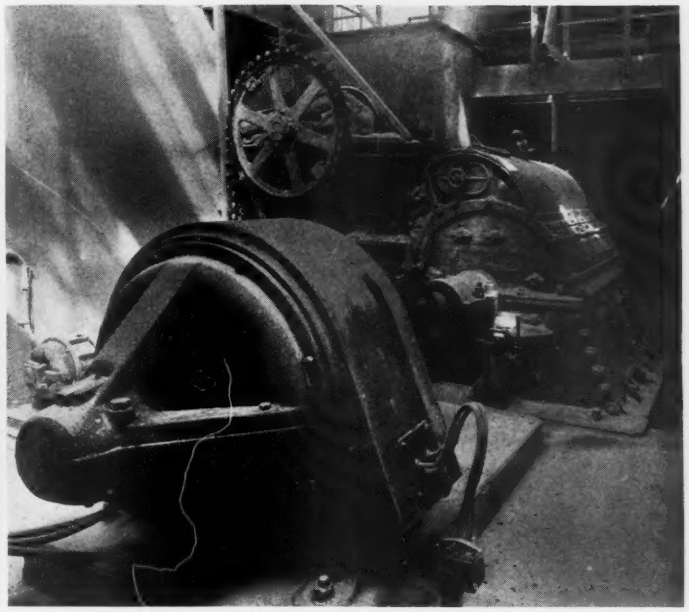
*Interior of crusher building showing the rock hopper in center foreground*




*Initial jaw crusher and apron feeder (above, right) from the rock hopper*



*Secondary crusher and feed—pan conveyor from primary crusher*

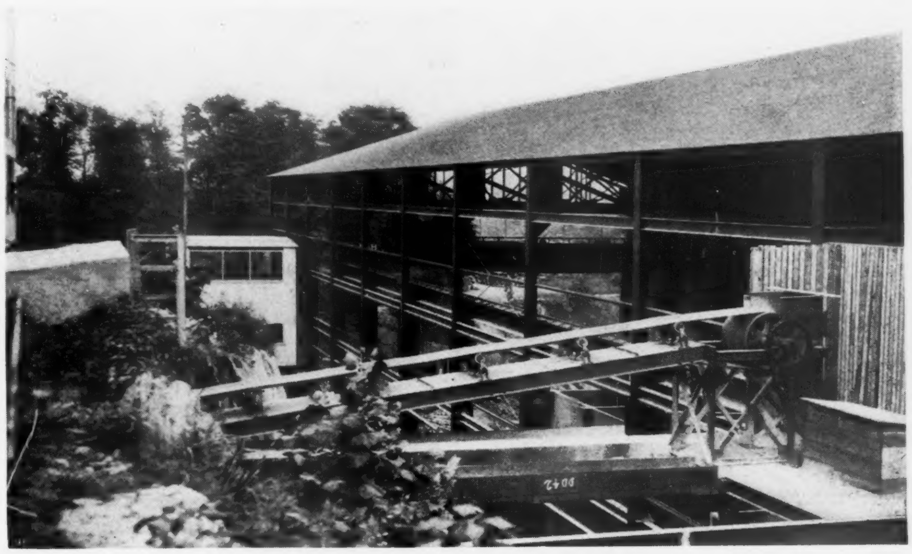


*Secondary crusher (hammer mill) and direct-connected motor drive*

or scraped out of the car into a track hopper below the car doors, and is raised to the top of a gypsum storage bin at the east end of the storage building by a Latimer 12-in. chain and bucket elevator.

### Mill Building

The mill building is on the east side of the storage building, with the axis of the mills at right angles to the axis of the storage building. The raw and clinker mills are of the same size, 7 ft. 3 in. diameter by 42 ft. 8 in. long, and each is of the three-compartment Solo type. The mills are fed, as described, by the crane in the storage building, through steel hoppers, projecting into the storage building, through special feeders. The wet raw mill is fed with two table feeders for proportioning high calcium and low calcium rock; the feeders discharge through automatic recording scales. The finish mill is also fed by two table feeders, one for clinker and the other for gypsum, discharging through automatic recording scales. The table feeders, automatic scales, mills, and the dust collector on the finish mill were furnished by the Polysius Corporation, Bethlehem, Penn.



*Belt conveyor for stone to storage building—at far end, clinker conveyors*

*Storage building from clinker end, showing how site was cut from solid ledge —Belt conveyor for stone in background*

Each of the mills is direct driven by a 700-hp. G.-E. supersynchronous motor (2200 v., 144 r.p.m.). Provision has been made in the mill building for another mill on both ends of the grinding process. Elevated platforms on the west side of the building give access to the feeders and scales. An elevated platform on the east side contains the switchboard and motor controls and the dust collector on the finish mill.

### Slurry Handling and Agitation

The slurry is discharged from the compartment mill through a feed tank to one of two 3-in. Wilfley slurry pumps, located in a concrete-lined trench across the ends

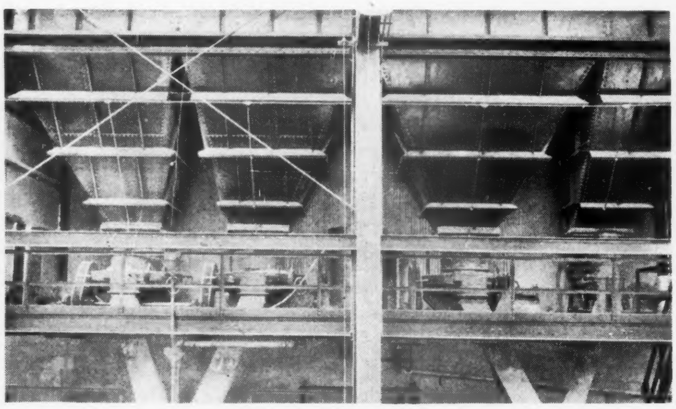
*Interior of storage building showing feeding hoppers to mills*

*Spare hammer mill and conveyor for imported stone—when necessary*

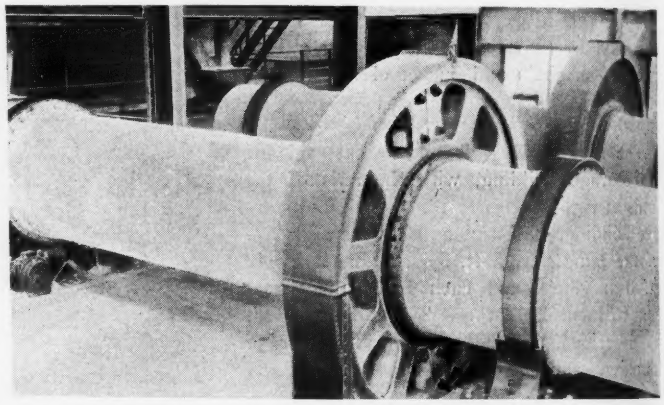
of the mills. One pump, of course, is a spare. Merco-Nordstrom valves and fittings are used throughout the slurry-handling system.

The slurry is pumped approximately 400 ft. and against a head of 95 ft. to 10 steel tanks, which have an approximate capacity of 8000 bbl. of slurry. These tanks are on the north side, near the west end of the kiln building. The tanks are 22 ft. diameter by 24 ft. deep. The tanks rest on a solid concrete foundation. All piping, valves and fittings (Merco-Nordstrom) are in the open. Three 4-in. Wilfley slurry pumps in a trench across the west end of the tanks are so connected with the slurry tanks that any pump can be used for kiln feed, or for transferring from any one tank to any other in the battery for correction purposes. These pumps are fed from a rectangular open trough, connected to all of the tanks. Dorr combination mechanical and air agitators are used for slurry agitation.

The slurry is delivered from the Wilfley pumps to the kiln feed tanks through Polysius revolving type feeders. The feed tank is designed to keep a constant head on the

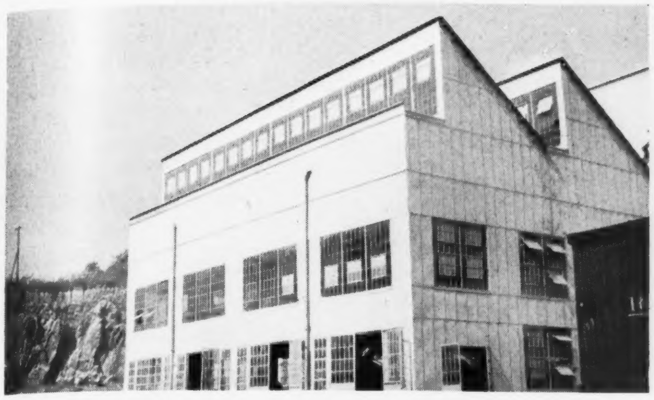


*Interior of mill building showing feed hopper for both stone (left) and clinker (right)*

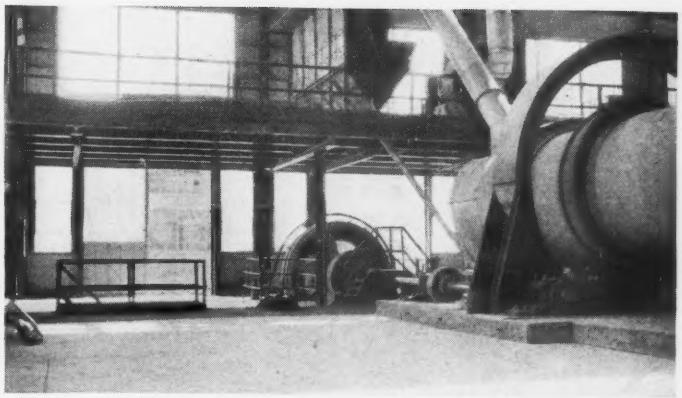


*Tube mills. The nearest is for raw grinding and the farther one for finish clinker grinding*

*Discharge end of mills (slurry in the foreground; clinker in the background) and the electric motor drives*



*Finish and raw grinding building*

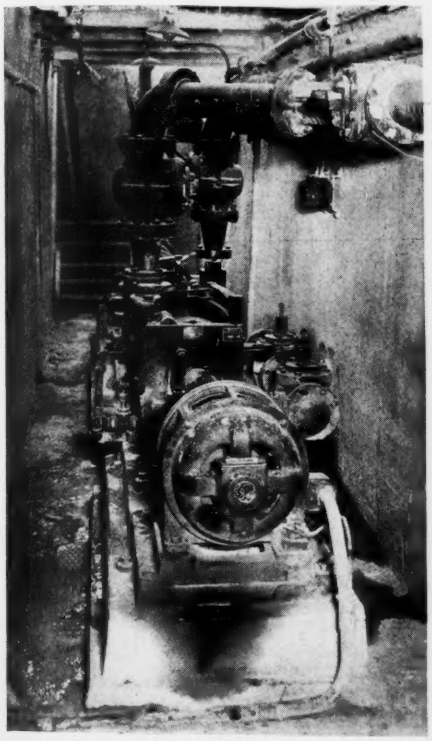


*Clinker mill, drive and dust collector in the mill building*

feeder, which may be regulated by changing the float level in the feed tank, and by a variable-speed motor. This is the first installation of these feeders in America.

### *Kilns and Coolers*

The kiln building houses two Polysius Solo kilns with attached coolers—the first installation of its kind in the United States.

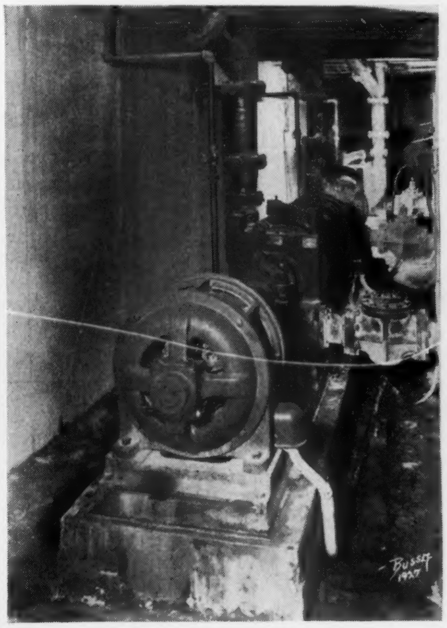


*Two 3-in. slurry pumps pumping to the slurry tanks*

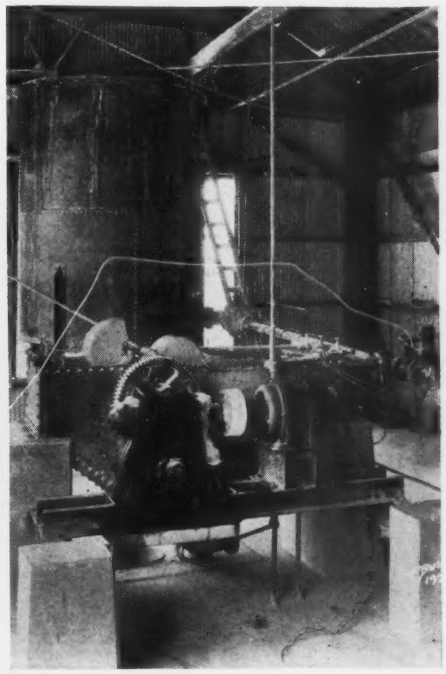
These kilns have three sections of different diameters—a double-shell cooling section 9 ft. 10 in. in diameter, 31 ft. long, a burning section 11 ft. 10 in. in diameter, 50 ft. long, and a preheating section 8 ft. 10 in. in diameter by 142 ft. long. The whole kiln is carried on six sets of rolls.

In this method of kiln construction the usual heavy brick kiln heads are done away with, as the view show.

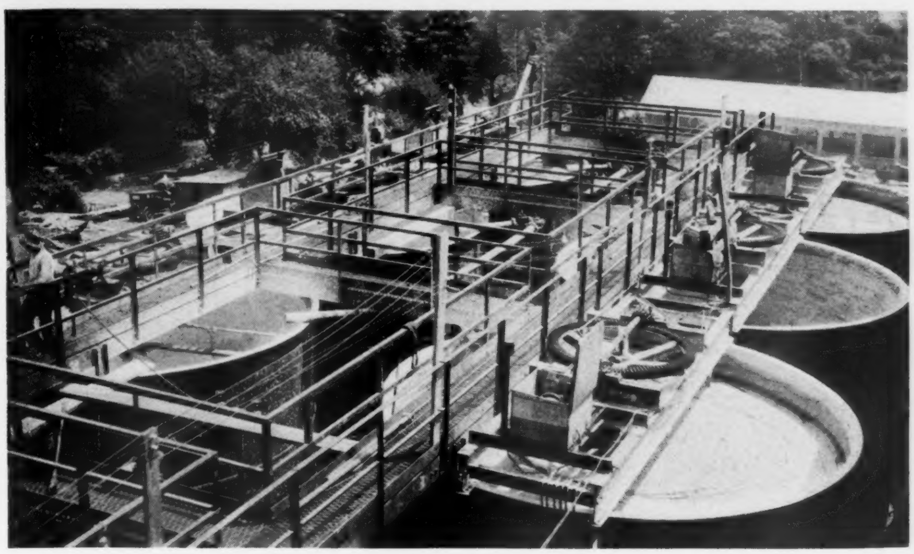
Each kiln is driven by a 50-hp. d.c. shunt-wound motor (230-v.), which provides for variable speeds. A Bristol recording vacuum gage, a recording pyrometer, and a $CO_2$ recorder are provided for kiln control. These instruments are all on the burning platform,



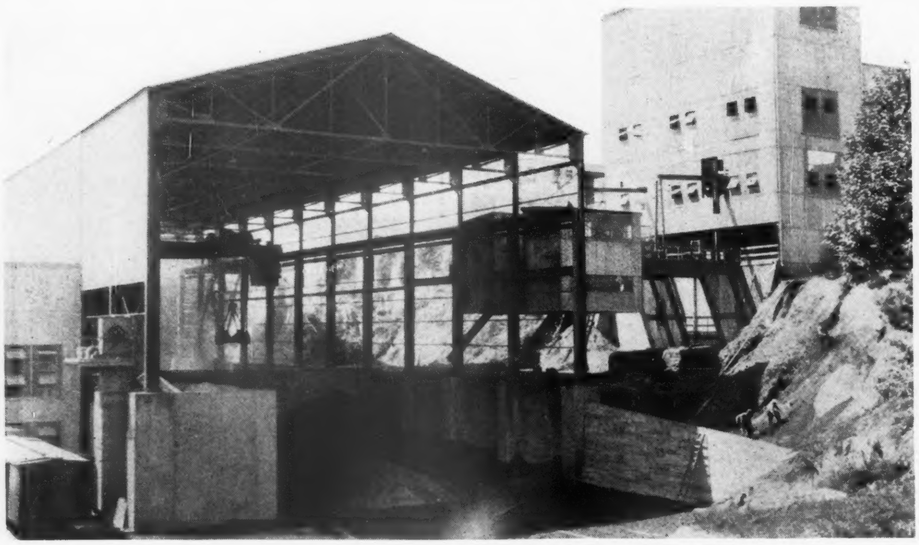
*Battery of three slurry pumps in trench at west end of slurry tanks*



*Slurry feeders on kilns—a type used in America for the first time in this plant*



*Tops of the slurry tanks looking down toward the shops which are on the same ground level as the mill building*



*Showing the relation of the mill building to the storage building—the bridge in the foreground carries the clinker conveyors*

as are also the controls for coal, kiln speed and slurry feed. All the air for combustion is taken in through ports in the shell of the cooler, and can be accurately controlled. Both kilns are connected through conduits to a single concrete stack 13 ft. inside diameter and 307 ft. high, built by the Rust Engineering Co., Pittsburgh, Penn. Provision has been made to install stack dust precipitators in the dust chamber between the kiln ends and the stack. The dust chamber is equipped with screw conveyors for removing the dust.

The kiln burners for pulverized coal are of a special type made by the Polysius Corporation for the Solo kiln. The burner is a steel pipe which projects as a cantilever through the cooler into the kilns, the length of the pipe being adjustable, so that the burning zone may be changed, within limits, at will.

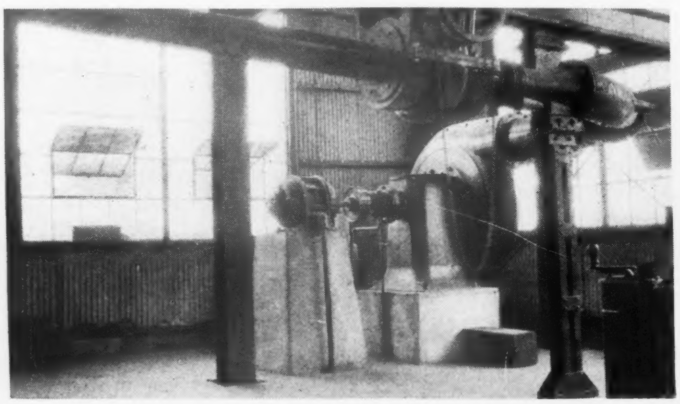
The coolers discharge through air-lock, automatically controlled, valves (part of the Solo kiln equipment) to Skipulters (conveyors) made by the F. L. Smidth & Co. The Skipulters extend from the ends of the coolers over a bridge structure to the west side of the storage building, where they discharge into the clinker storage through Richardson automatic scales, which record weighed batches of clinker as it drops into storage. The Skipulters are driven by 7½-hp., 440-v., 868 r.p.m. G.-E. induction motors through De Laval worm gear speed reducers.

The handling of the clinker from storage to mill, and the finish mill unit have already been described under "Mill Building." The finished cement is delivered to a 6-in. Fuller-Kinyon pump, in the trench across the ends of the mills that contains the slurry pumps, and is pumped to the storage silos, 770 ft. distant from the mill.

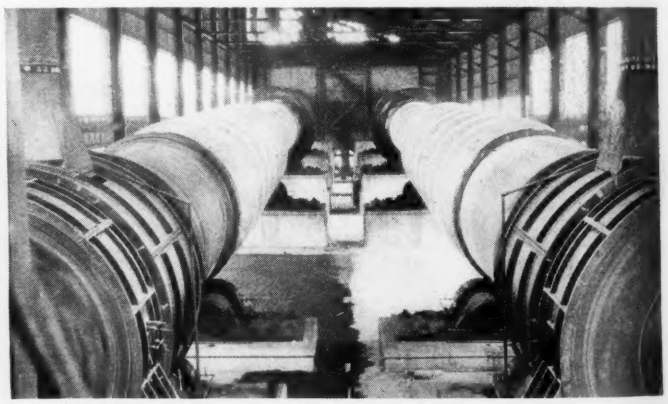
### *Silos and Packing Plant*

The reinforced-concrete silos, designed and erected by the Macdonald Engineering Co., have an aggregate capacity of 130,000 bbl. consisting of one cirular bin 50 ft. in diameter, eight bins 20 ft. in dameter and seven interstice bins. The height of the silos is 90 ft. The silos are not only separated from the mills by about eight hundred feet, but also separated from the packing plant by almost as great a distance.

Under the silos are three tunnels, each equipped with a portable Fuller-Kinyon

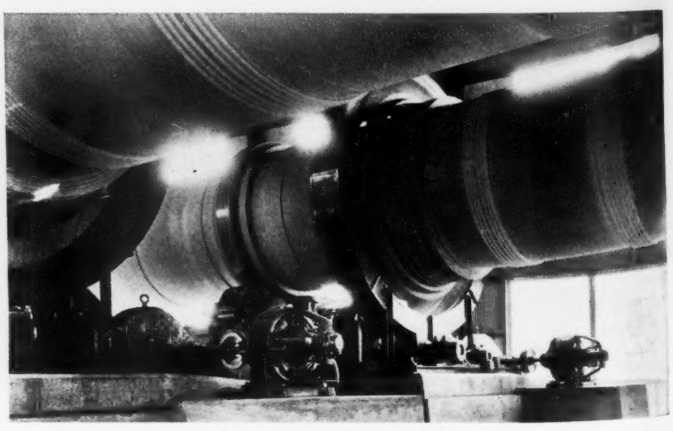


*Fan and conduit supplying pulverized coal to the kiln burners*

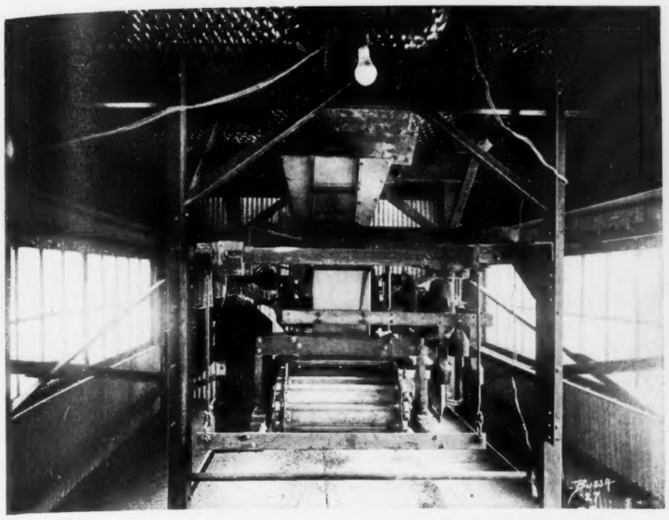


*Kilns with coolers attached—as seen from discharge ends*

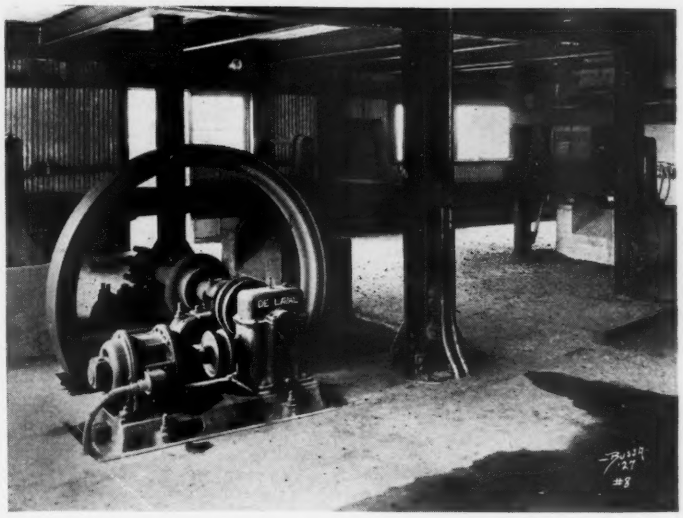
*Looking over the tops of the kilns from the feed ends towards the cooler ends*



*The kilns and the 50-hp. variable-speed direct-current motors driving them*

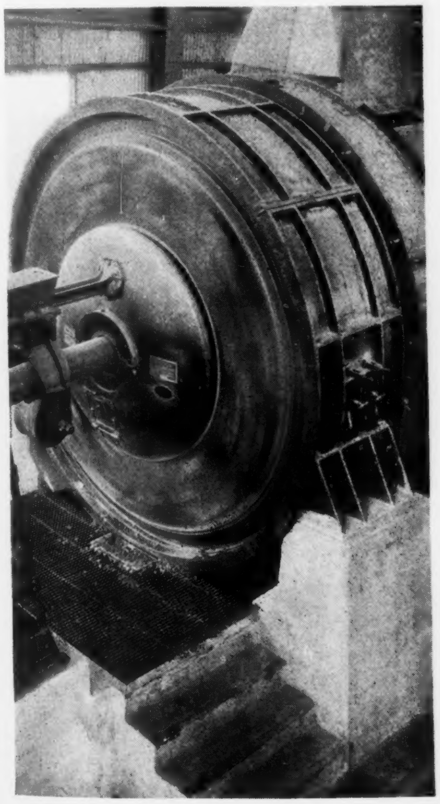


*One of the automatic weighing machines under the discharge end of the clinker conveyor*



*Clinker conveyor with motor and speed reducer drive; air lock on clinker cooler shows at the right*

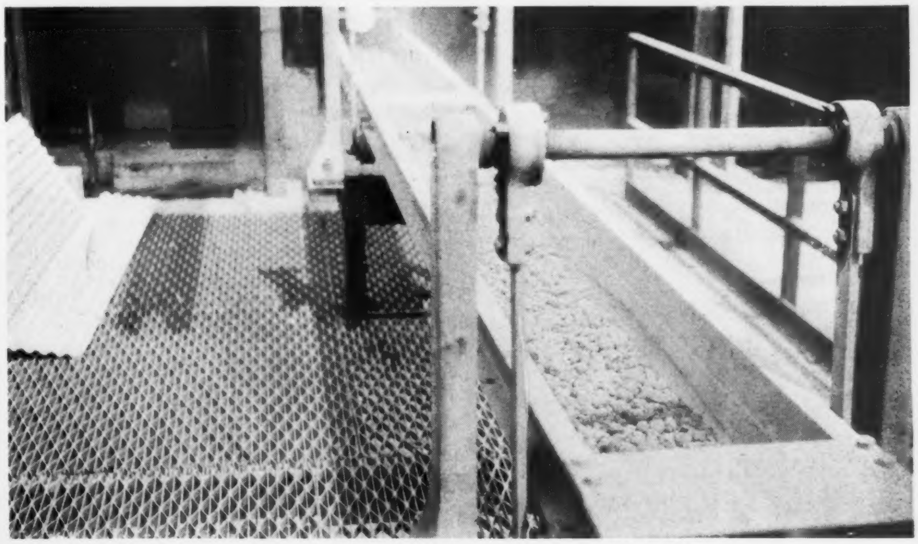
pump on rails, which transfers the cement from the silos to the bins in the pack house. The pack house is also located on the highway, which separates it from all the other units in the plant. The piping system for the Fuller-Kinyon pumps is underground, both



*Discharge end of one of the kiln coolers*

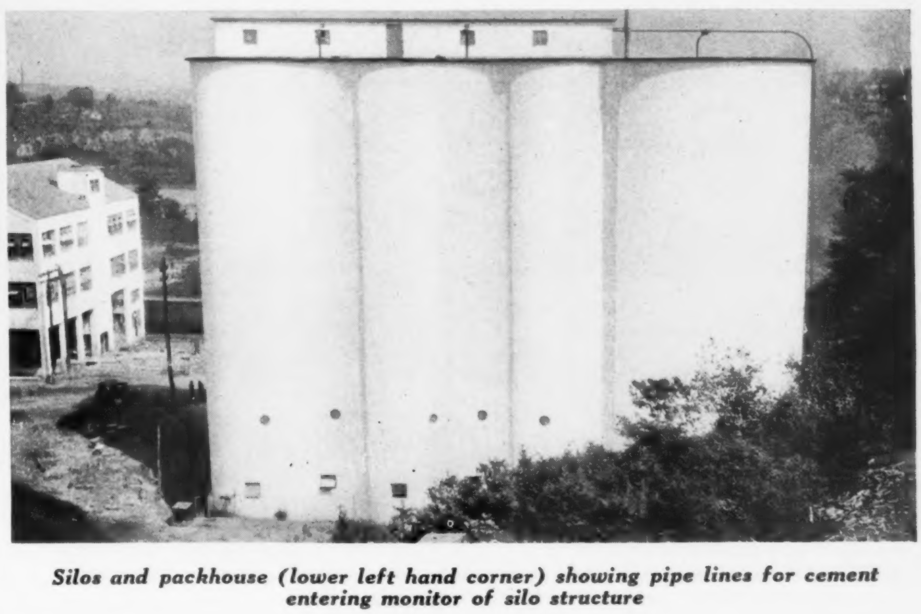
from mills to silos and from silos to pack house.

The pack house has three driveways for trucks, making it possible to load three trucks at once. Trucks are loaded by means of Chain-Belt Co. suspended belt conveyors, which are raised and lowered at the discharge ends by Shepard "Liftabout" electric hoists. The bagging machines are mounted

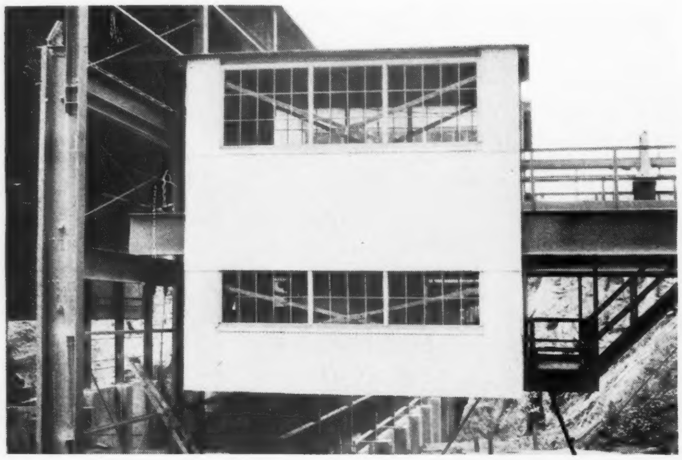


*One of the clinker conveyors—looking towards receiving end—under the cooler discharge*

at the head-end of these conveyors and discharge directly on the conveyors. An unofficial truck-loading record was established there recently of 130 bags (a load for a 5-



*Silos and packhouse (lower left hand corner) showing pipe lines for cement entering monitor of silo structure*

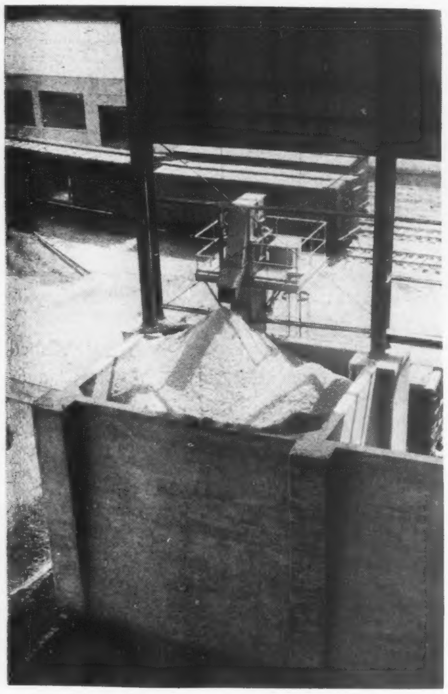


*Bridge structure housing clinker weighing machines*

*Kiln building and clinker end of storage building*

ton truck) in 9 minutes. At such a rate, allowing one minute between trucks, it is possible to load out, in a 10-hour day, 5850 bbl., using of course, all three of the conveyors. There are three 4-valve Bates valve-bag packers for truck loading.

On the opposite end of the building from the truck-loading end are the railway tracks. One track runs through the building and the other on the outside of it, making it possible to load two cars at once. There are two 4-valve Bates valve-bag packing machines for railway car loading. The railway connec-



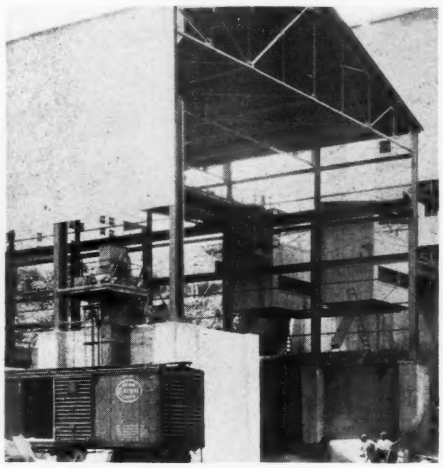
*Gypsum receiving bin in clinker corner of storage building*

tion is either with the Philadelphia and Reading, the Pennsylvania or the Upper Merion and Plymouth railroads.

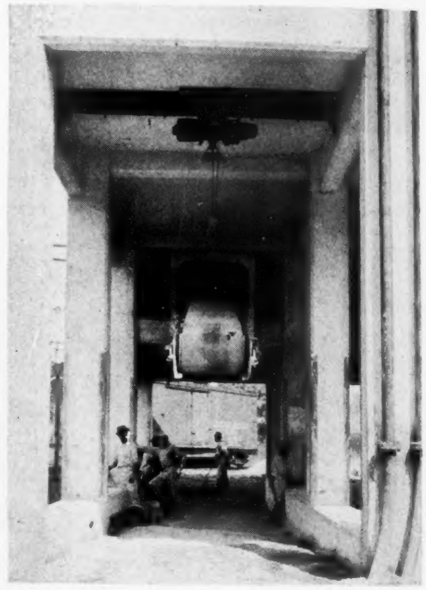
A Fuller-Kinyon pump, mounted in a concrete-lined tunnel under the pack house, removes the spillage from the car-loading packers and pumps it back into the bins above the packers.

A 2-ton capacity Otis elevator is installed for handling bags from the ground to the second and third floors. The second floor is used exclusively for the storage of bags. The truck-trade packers are mounted just below the level of the second floor.

On the third floor are the bag cleaner and dust collectors. The former is of unusual design and is said to be the first installation



*Gypsum receiving conveyor in foreground and clinker discharge from weighing machines in background*

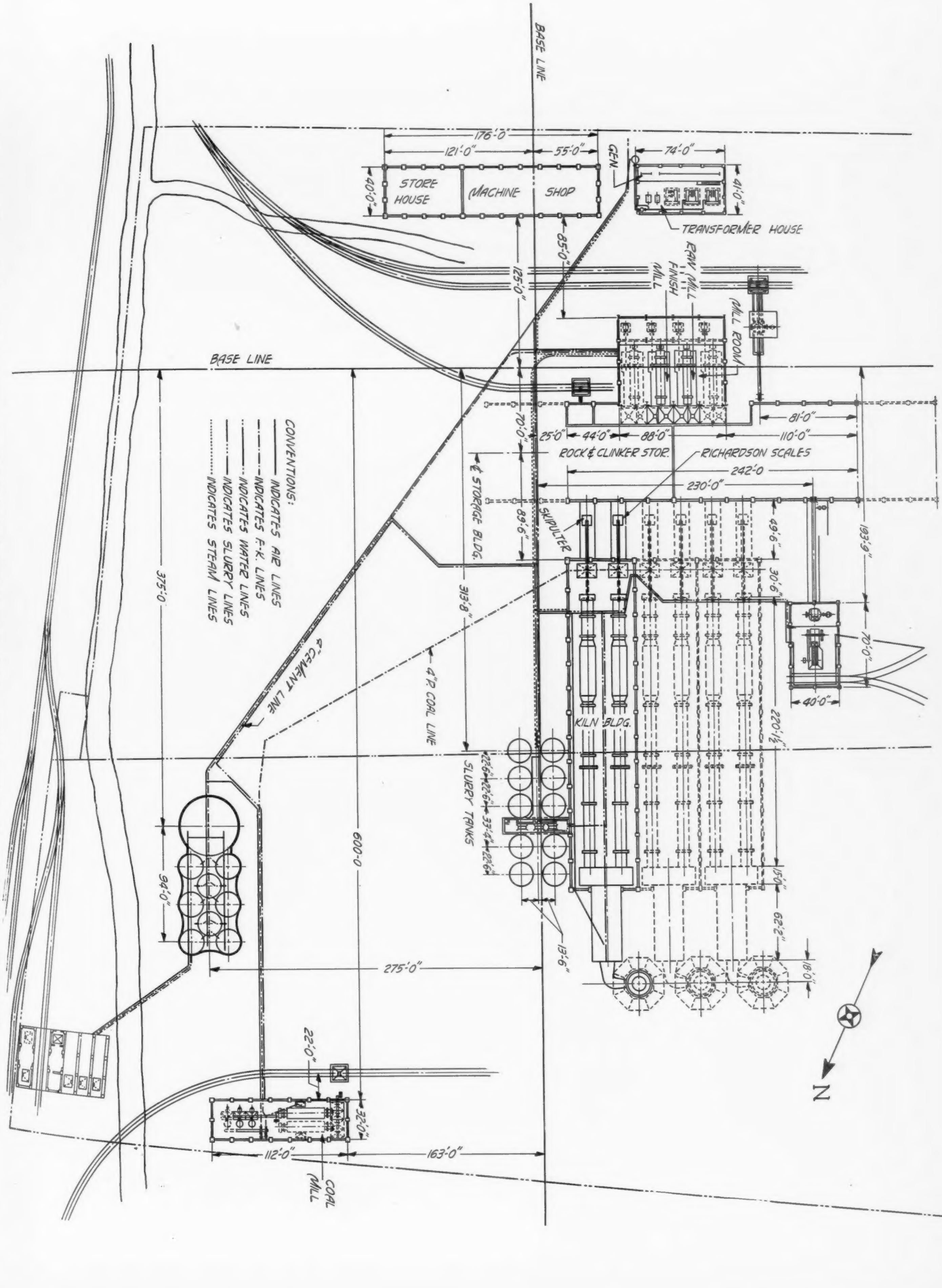


*Truck driveway and flexible belt conveyor for loading trucks*

of its kind in any kind of plant. It is entirely encased in a concrete shell, so that it conforms with the remainder of the plant insofar as "concrete wherever possible" is

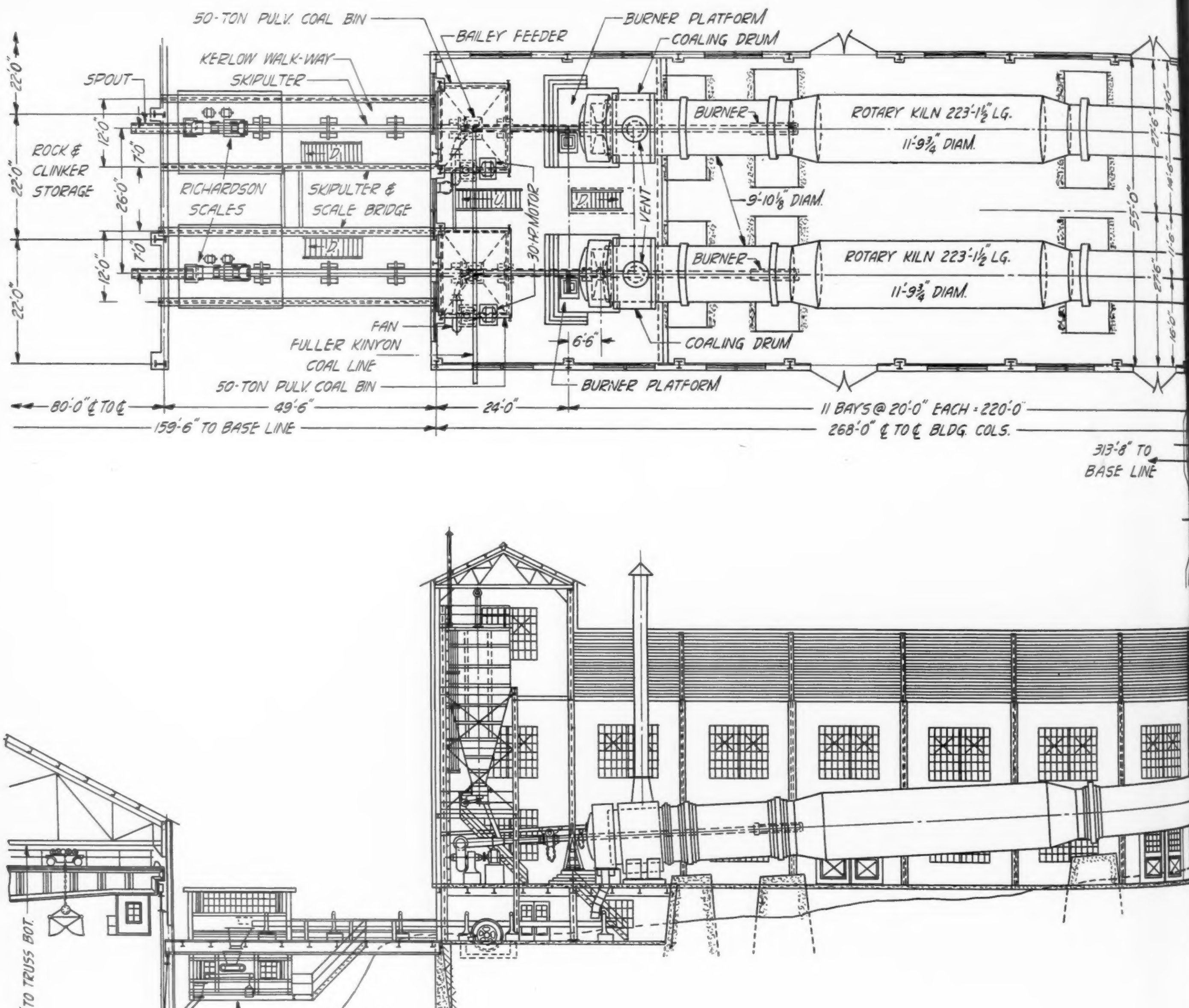
*General view of silos, coal mill and packhouse (right)*

*General plan of the recently completed West Conshohocken, Penn., cement mill of the Valley Forge Cement Co.*

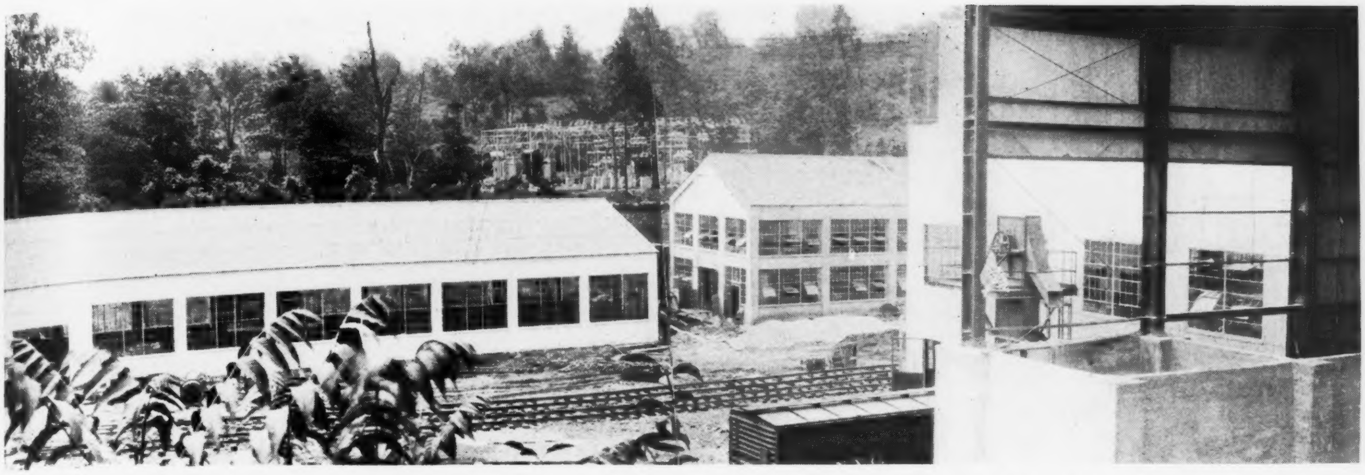



General plan of the recently completed West Conshohocken, Penn., cement mill of the Valley Forge Cement Co.

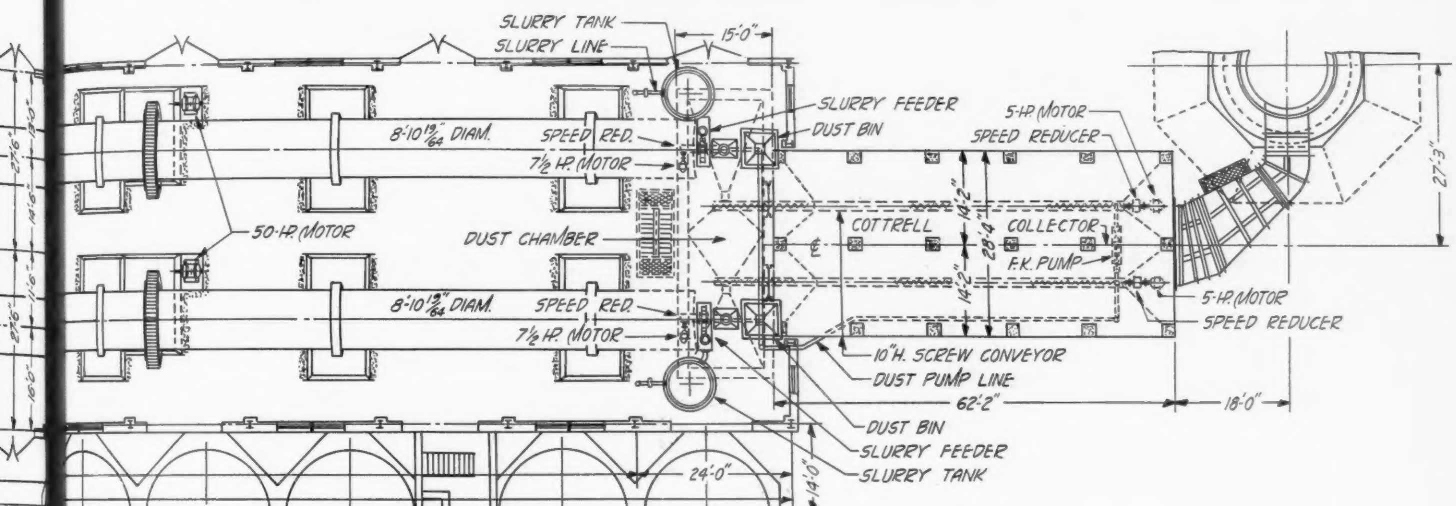
*Coal mill, silos, stack, kiln dust chamber and kiln building*




**General arrangement of equipment and plan and longitudinal elevation of kiln b**

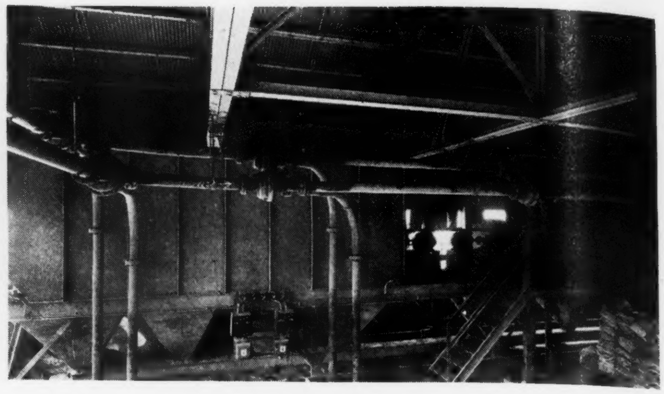


*Shop building (left), switchboard and compressor building, corner of mill building (right) and end of storage building (gypsum hopper) extreme right; transformer station in center background*




tion of kiln building at the West Conshohocken, Penn., plant of the Valley Forge Cement Co.

*Sorting belt and dust collectors on top floor of packhouse*



*Top of packhouse showing incoming pipe lines from silos and dust collectors*

concerned. Clean bags from the cleaner are discharged on a belt conveyor which in turn discharges on a sorting table. The conveyor belt itself is of unusual design, as it consists of two 6-in. strips of belting, spaced about 20 in. apart and held apart by metal strips at several-feet intervals. Rawhide laces form a network which is small enough to keep the bags from falling through, but large enough to permit stones or other particles to drop through. The cleaner complete, was furnished by the Modern Valve Bag Co.

The dust collectors in the pack house, like those in the remainder of the plant, were installed by the Northern Blower Co.

### Coal Mill

The coal mill equipment is all of Fuller-Lehigh Co. manufacture. Coal is received in hopper bottom cars, which empty into a track hopper feeding a 12-in. Latimer chain and bucket elevator to an elevated steel bin in the mill building over the dryer. A Brownhoist locomotive crane is used for switching coal cars, and for stock piling the coal adjacent to the mill building.

*Cement pump in trench at end of mill in mill building*

*The pump in the foreground is transferring finished cement to silos 770 ft. distant*

*Bag cleaner and dust collector connection*

The coal dryer is a 5 ft. 6 in. by 42 ft. indirect fired rotary dryer. The dried coal is elevated by a 12-in. Latimer bucket elevator to the pulverizer bins. The coal pulverizers are the new type 48-in. gear-driven, screen type Fuller mills, which have various Hyatt roller bearings and Kingsbury thrust bearings. The bearings are supplied with oil by a geared pump on the pinion bearing casing. They are direct connected to 125-hp., 2200-v., 514-r.p.m. supersynchronous G.-E. motors—the first use of this type motor on coal mills in a cement plant.

The pulverized coal is collected in the usual way with screw conveyors and fed to a 6-in. Fuller-Kinyon pump, which transfers in through an underground pipe to the kiln-firing platform, a distance of approximately 727 ft. including a lift of 104 ft.

### *Power House and Substation*

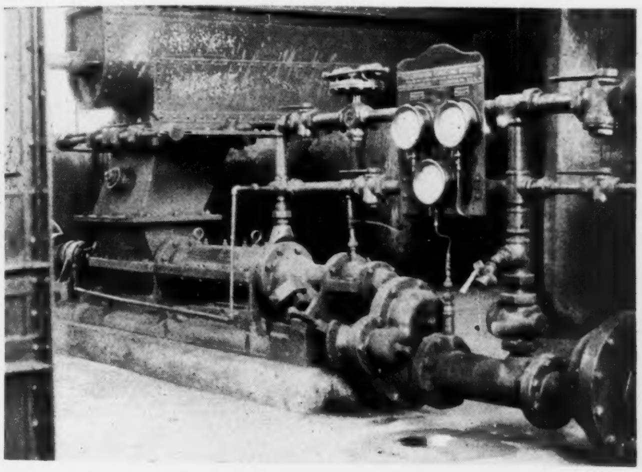
All electric power is purchased from the Counties Gas and Electric Co., delivered to the plant's transformers at 33,000 v. The transformers deliver the current to the main switchboard at 2300-v. The transformer and switchboard are of the most up-to-the-moment type and were built and installed by the Westinghouse Electric and Manufacturing Co.

The switchboard building also houses two Chicago Pneumatic Tool Co. air compressors, installed and equipped with after coolers and receivers. Each compressor has a piston displacement of 1722 cu. ft. of air per minute, and an actual delivery of 1459 cu. ft. Each compressor is driven by a direct-connected 300-hp., 2200-v., 225-r.p.m. G.-E. supersynchronous motor.

The switchboard building also contains two motor-generator units of 150-k.w. capacity each. Each generator is driven by a 225-hp. General Electric motor, 2200-v., and develops 600 amp. at 250 v., d.c.

***Packhouse showing the three driveways for motor-truck shipments***

To the north of the power house is the machine shop and store building, which is 40 ft. wide, 176 ft. long, and contains more than the average cement-mill machine shop



***Pump for coal from coal mills to kilns located in the coal grinding mill***

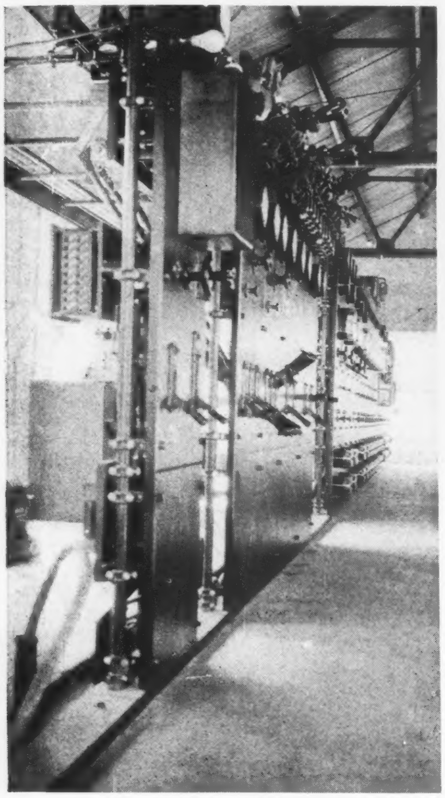
***Feeders for pulverized coal (above on landing), and coal pulverizers (left center) direct connected to supersynchronous motors***

***Interior of coal mill building showing the coal dryer***

equipment of shapers, lathes, shears, electric trip hammer, etc. One end of the building serves for a systematic store house for all machine parts, as well as small stuff.

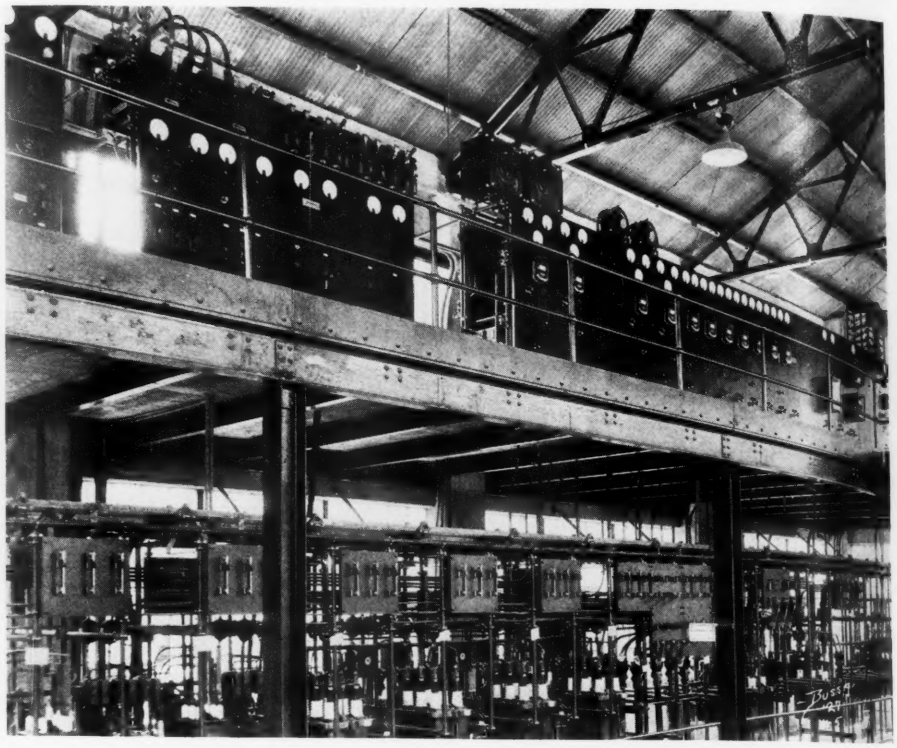
### General Comments

The foregoing description does not include an office and laboratory, because these



**Looking along the main switchboard**

are in the making. When completed they will be in keeping with the rest of the plant, which certainly is going to be one of the "show plants" of the country.

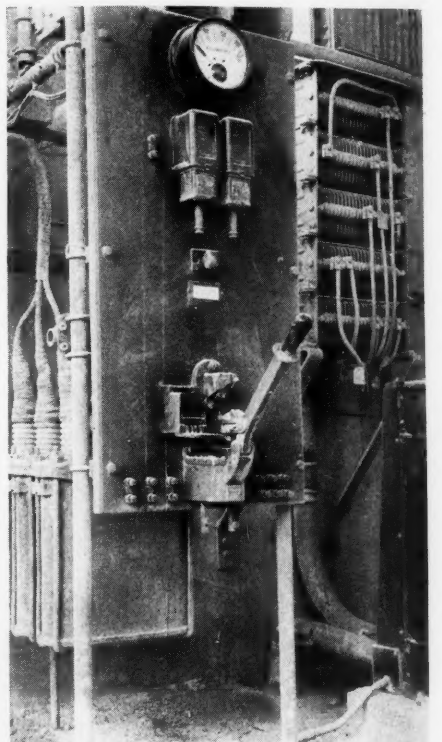


**The main switchboard—one of the finest ever installed in a cement mill**

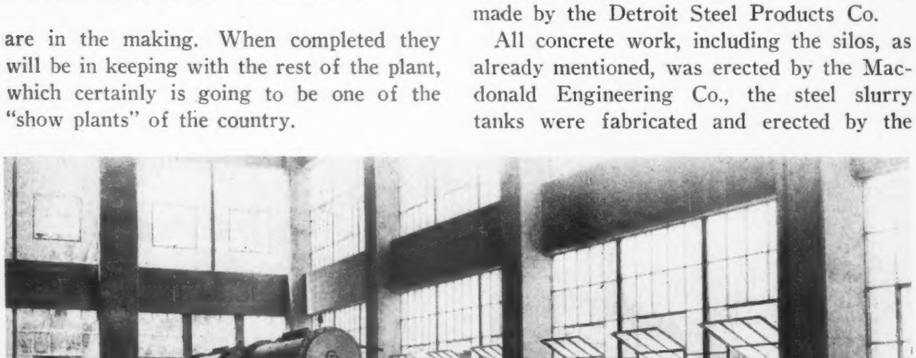
All of the buildings make an excellent appearance. Where not of reinforced-concrete they are of structural steel covered with gray corrugated cement-asbestos siding, furnished by the Asbestos Shingle, Slate and Sheathing Co. The mill building has the saw-tooth type of roof, giving far more light than is usual in cement-mill buildings. All the buildings are remarkably well lighted by windows, all of which have steel sash made by the Detroit Steel Products Co.

All concrete work, including the silos, as already mentioned, was erected by the Macdonald Engineering Co., the steel slurry tanks were fabricated and erected by the McDermott Brothers, Allentown, Penn., the structural steel work by the Lehigh Structural Steel Co., Allentown, Penn. The design and construction of the plant were under the supervision of A. E. Douglass of the Valley Forge Cement Co.

Besides the equipment mentioned numerous angle speed reducers in the plant were



**One of the motor controls in the crusher building**



**Tandem compressors and d.c. generator sets (foreground) in the switchboard building**

***Coal mill (left) and pack house from elevation back of the plant***

furnished by the De Laval Steam Turbine Co. All the motors, unless otherwise noted, were furnished by the General Electric Co.

As pointed out in our preface, one of the main features of the plant is its construction on what would ordinarily have been considered an impossible site, due to the irregular topography. In designing the plant, it was first necessary to locate the pack house, coal mill, store house and gypsum hopper where they could be reached with railway tracks from the outside. This was done by enlarging two small quarries, which were already on the property, moving approximately 120,000 cu. yd. of rock and earth.

The next step was to locate the machine shop and storage building, the substation and the mill building at one low point, and the pack house, coal mill and silos at the other low point. The rest of the plant had to go up on the hill, which was the only place left for it.

As already noted, only the possibility of efficient pumping and pipe-line transportation of slurry, cement and coal made such a layout practicable.

The officers of the Valley Forge Cement Co. are: Col. J. W. Fuller, president; C. H. Breerwood, vice-president and general manager; R. S. Weaver, secretary and treasurer; F. A. Weibel, assistant treasurer; R. F. Weston, general superintendent; C. H. Moore, superintendent of construction; W. H. Andrews, supervising chemist.

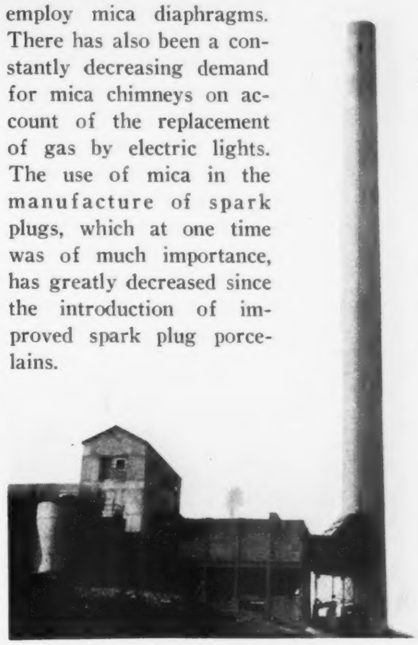
This plant is also remarkable for the speed with which it was built. Ground was broken January 9, 1927. The first concrete was poured February 2. The first rock was crushed June 13. The first slurry was ground July 2; the first clinker burned July 19; the first cement produced July 22; and the first shipment of cement was made July 30. The approximate capacity of the 2-kiln plant now operating is 2300 bbl. per day.

***The new Valley Forge Portland Cement Co.—from a point near the quarry***

## Uses of Mica

THE chief use of mica is in the electrical industries, states the United States Bureau of Mines, Department of Commerce. One very widespread and important use is in the manufacture of the transmitter button, an integral part of the modern telephone instrument. Mica is also used in the manufacture of lightning arresters, condensers, commutators, and many special types of equipment. In addition to its use for the glazing of stoves and furnaces, mica is manufactured into lamp chimneys, particularly for gas and gasoline lamps. For this purpose the mica must be clear, even splitting and flexible; little domestic mica is suitable for this purpose. Ground mica is utilized in the preparation of rolled roofing; it is dusted on the roofing material before rolling, and thereby prevents sticking of the rolls. A pound of mica has great covering power because of the flat shape of the thin particles. Ground mica is also used as a decorative material on wall paper and in special paints. It is occasionally employed as a facing for concrete to simulate granite. Coarsely-ground material is used for decoration and is sold under the name of Christmas-tree snow; the tonnage of material consumed in this market reaches an appreciable figure. Finely ground mica is used as a lubricant incorporated with greases, and also alone, especially as a tire powder. It is also used extensively as a rubber filler and in many other minor industries.

Very flat and sound high-grade mica was previously in great demand for diaphragm use in phonographs. During the past year the demand in this market has shown a great decrease, due to competition with the radio and to the development of new types of phonographs which do not employ mica diaphragms. There has also been a constantly decreasing demand for mica chimneys on account of the replacement of gas by electric lights. The use of mica in the manufacture of spark plugs, which at one time was of much importance, has greatly decreased since the introduction of improved spark plug porcelains.



***Stack and flue connections to the kilns***

The sudden and surprising development of the radio industry has created a market for very large quantities of mica, particularly in the smaller sizes of sheet material suitable for the manufacture of condensers. A certain amount of diaphragm mica has also been consumed in the manufacture of head phones and loud speakers, but this does not compensate for the decreased demand in the phonograph trade.

It is anticipated that the future expansion of the electrical industries will supply a market for large quantities of sheet mica and splittings. The projected electrification of certain railroad lines and the development of the oil-electric locomotives will also demand large quantities of this mineral.

Other uses are expected to be developed for mica, several producers being reported engaged in research work.

*Crushing plant of the Riverton Lime Co., Riverton, Va.—Kiln stone loading bin at the left*

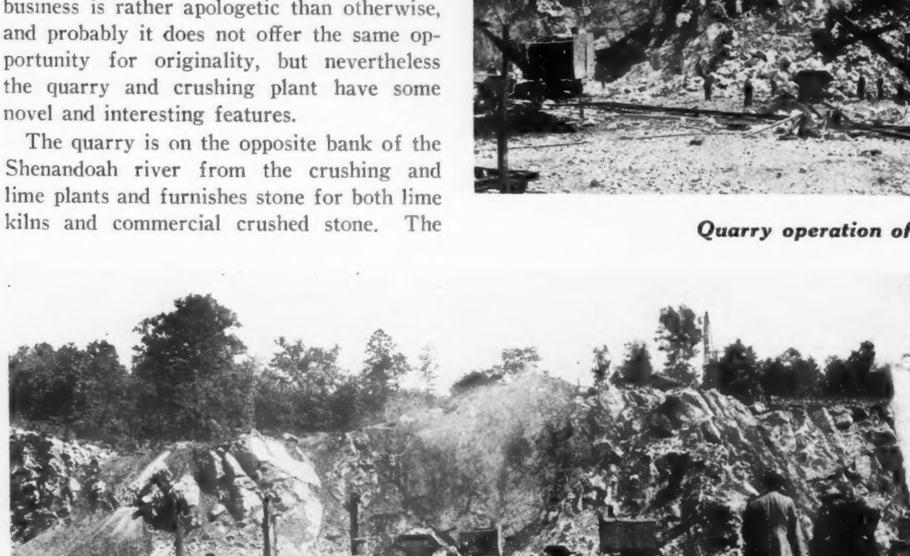
# Riverton Lime Company's Quarry and Crushed Stone Plant

## An Unusual Quarry Transportation System Without a Locomotive

WILLIAM E. CARSON and his Riverton Lime Co., Riverton, Va., are well known in the lime industry, but it is not generally known that he is also one of the principal crushed-stone producers of Virginia. Readers of ROCK PRODUCTS from previous articles on the lime plant know that Mr. Carson is of an inventive turn of mind and has put many original ideas into practice at his lime plant, and that he is always generating new ideas. His attitude toward his crushed-stone business is rather apologetic than otherwise, and probably it does not offer the same opportunity for originality, but nevertheless the quarry and crushing plant have some novel and interesting features.

The quarry is on the opposite bank of the Shenandoah river from the crushing and lime plants and furnishes stone for both lime kilns and commercial crushed stone. The original intention in building the crushing plant was merely to merchandise the small sizes of stone not required for the lime kilns, but for the last year or two it has been operated to capacity—600 to 700 tons a day—for its crushed stone product has been in demand.

*Quarry operation of the Riverton Lime Co.*



*Another quarry view showing post supports for wire cables*

Incidentally, this crushing plant has demonstrated that one of the most feasible ways to use quarry spalls in a shovel-operated quarry is to make them into commercial crushed stone; and it has also proved that a crushed stone business, or a crushed stone by-product, if the lime manufacturer so regards it, is a very excellent way to balance the usual ups and downs of the lime business.

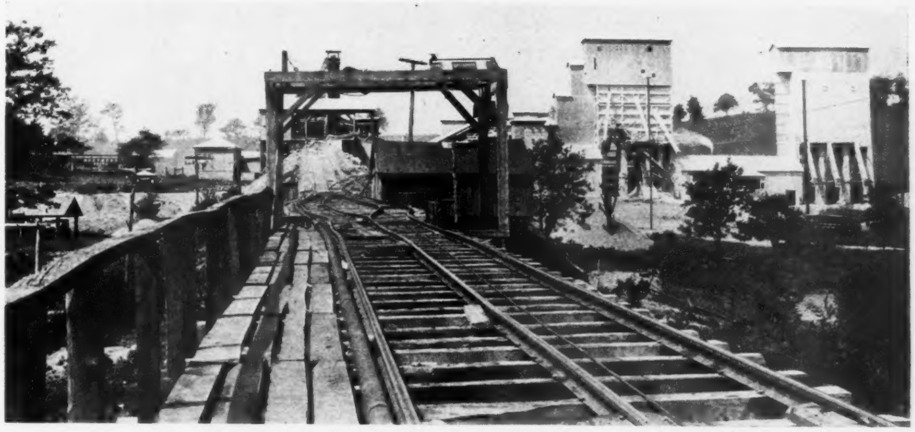
Perhaps the most interesting feature of

the quarry is that here is a three-shovel quarry operation with quite an extensive transportation system operated entirely by hoists and wire-rope cables. The shovels are 20-ton revolving (steam-operated) Marions on traction wheels. The cars are 8-ton all-steel Easton "Phoenix" type. A fan-shaped 3-ft. gage track layout serves each shovel.

A two-drum hoist in a housing at the outer edge of the quarry serves two loading trucks simultaneously. This hoist, by means of hook-end cables, pulls cars from any one of the shovels to concentration or assembly tracks near the hoist house. The empty cars return to the shovel by gravity—and carry the ends of the cables with them. The hoist is driven by a 50-hp. General Electric induction motor through a Link-Belt silent chain drive.

A second two-drum hoist is located in the crushing plant. It is remotely controlled from a point opposite the hopper where the quarry cars are dumped. This hoist handles the cars from the assembly tracks at the quarry, across the bridge and up the incline to the crusher hopper. One drum handles the incoming loaded car and the other the returning empty car. The track has three rails with a turnout, or passing track, on the bridge. This hoist is driven by a 55-hp. General Electric motor through a Link-Belt silent chain drive and is equipped with solenoid brakes.

*Hoist house at the edge of the quarry which handles the cars from shovel to tracks shown in foreground*



*Three-rail track with passing point on the bridge*

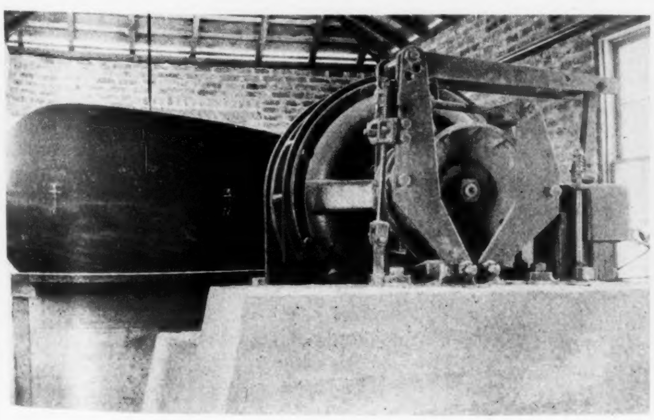
#### Dumping Hopper and Crusher

Another unusual feature of the plant is the arrangement of the receiving hopper and primary crusher. In order to save headroom and to provide for more regular feeding of the primary crusher, the quarry cars instead of dumping directly into a hopper-feed to the mouth of the crusher, dump into a concrete hopper which feeds a 40-in. pan conveyor (Link-Belt), which in turn feeds the primary crusher, a 42x40-in. Power and Mining Machinery Co. jaw crusher.

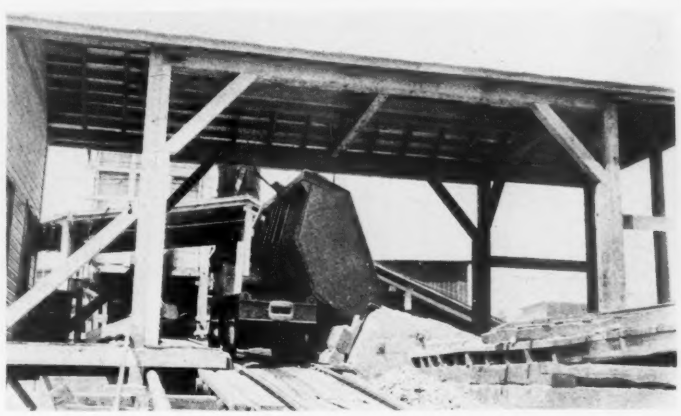
The little sketch on page 68 shows the essentials of the feeding mechanism from hopper to pan conveyor. Its actual working out was attended with considerable difficulties, for to get large-size quarry stone to a pan conveyor in this manner is more or less unique. Originally the stone was dumped directly on the conveyor, but the method shown of breaking the rush of stone against the wall of the hopper, and feeding it the reverse direction by gravity to the conveyor from the side, was found more satisfactory. The pan conveyor raises the stone about 20 ft. to the crusher opening. The primary crusher is belt-driven by a 100-hp. Allis-Chalmers induction motor, and the pan conveyor by a 50-hp. Westinghouse induction motor.

The output of the primary crusher feeds to a second 40-in. Link-Belt pan conveyor at right angles to the others. This conveyor feeds into a rotary scalping screen equipped with a dust jacket which passes the dust to a waste pile or to a pulverizing unit (a Symons disc crusher).

The stone passing the scalping screen proper is elevated to the sizing screens, and the oversize or tailings are diverted to a pan conveyor at right angles to the axis of the screen and conveyed to a bin from which the lime kilns are fed, or are run into a No. 9 Allis-Chalmers gyratory crusher for reduction to commercial crushed stone. The Symons disc crusher is driven by a 50-hp. Westinghouse induction motor. This crusher



*Hoist for cars from quarry assembly tracks to crusher*



*Quarry car dumping into hopper of primary feeder*

Pan conveyor from hopper to primary crusher

Discharge end of pan conveyor to crusher

is connected with the suction of a Sturtevant fan which removes the dust.

The rest of the plant consists of the usual rotary sizing screens and vibrating screens and bins for loading railway cars.

One of Mr. Carson's evidences of originality and his bent for investigation and research is evidenced by his study of blasting. In order to determine the characteristics of his limestone and the effect of various blast hole loadings on it he had small blocks of stone prepared, so that holes could be drilled in them and miniature charges of various explosives exploded. In this way he determined some of the physical characteristics of his rock and how to shoot it to the best advantage—the only example of original research in blasting by a quarry owner that we have ever run across.

## Lime Treatment of Water to Prevent Corrosion

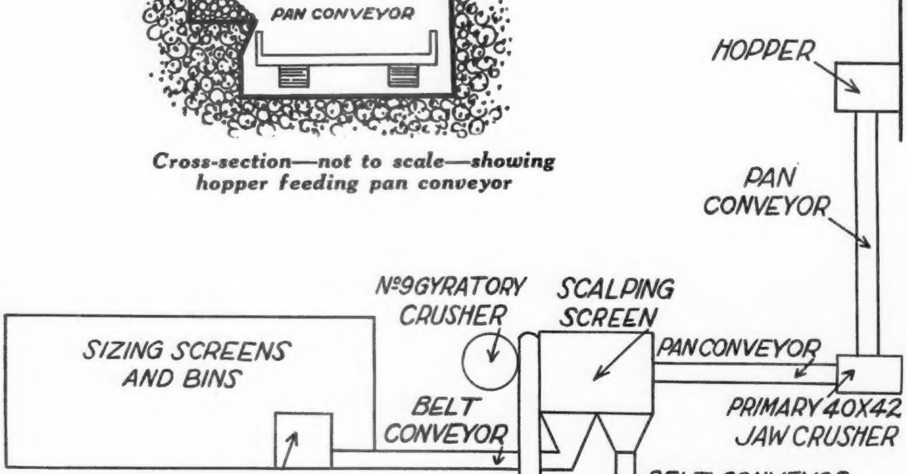
UNTIL recently, deterioration of metal pipes and conduits exposed to water was thought to be unavoidable. The feeling of engineers had been that an ideal metal or a durable coating would solve this problem, but within the past few years it became quite evident that it was a problem for the water chemist to solve by treating the water to prevent deterioration of the pipes. This is best done, says J. R. Baylis in *Industrial and Engineering Chemistry*, by the establishment of conditions that will produce a well-adhering coating over the metal—the most economic method being to add lime to produce the desired alkalinity. He concludes:

"Taking everything into consideration, evidence indicates that water saturated with calcium carbonate offers fairly good resistance to the corrosion of iron and it does not fill the pipes with a lime incrustation as is the case when it is more alkaline. It is true that better protection to the iron is obtained if the water is slightly supersaturated with calcium carbonate, but the limestone incrustation should not be permitted to build up too thick. It might be advantageous to treat the water until a calcium carbonate coating covers the entire surface, then adjust the equilibrium of the water to where it neither precipitates more calcium carbonate nor dissolves the coating already formed.

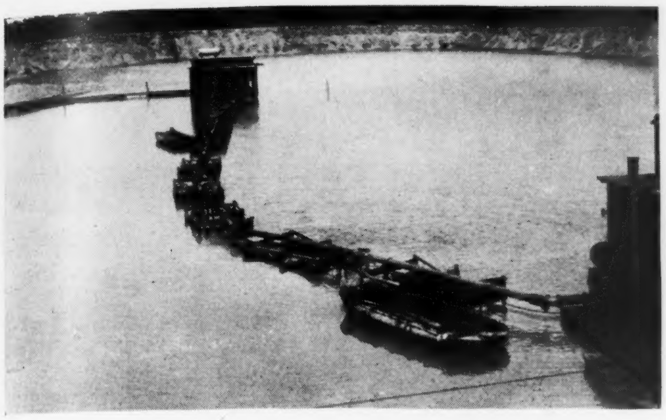
"For waters below the saturation equilibrium of calcium carbonate the cheapest means of making it more alkaline is to add lime, but this may not always be the most desirable treatment. Increasing the calcium content increases the hardness and costs more for soap, for boiler uses, etc. When the calcium carbonate concentration is less than about 25 p.p.m., it is believed that lime should be added in making the adjustment."

W. E. Carson and F. P. Purcell, quarry superintendent


Cross-section—not to scale—showing hopper feeding pan conveyor




General plan—not to scale—showing relative location of equipment in crushing plant



*Main dredge and booster dredge, Kirkpatrick Sand and Cement Co.*

*The main dredge digging at the Kirkpatrick deposit near Jackson's Lake*

# Jackson's Lake, Ala. Plant of the Kirkpatrick Sand and Cement Co.

## Well-Designed Digging and Boosting Dredges Operated by Diesel Power Are Some Features

THE Kirkpatrick Sand and Cement Co., of Birmingham, Ala., operates several plants in Alabama and Georgia. One of these is at Jackson's Lake, about five miles from Montgomery, Ala., and has dredging equipment, part of which is a most unusual booster dredge. Perhaps this boat could hardly be called a dredge, since it is only a boosting plant that could not well be used for excavation. It was built in the early part of 1927.

Both the booster and the main dredge are Diesel powered and both have Worthington two-cycle engines. The digging dredge was built a little over three years ago, so the booster has a somewhat newer type of engine. But both engines are very satisfactory for this kind of work and both are expected to outlast the life of the deposit, producing sand and gravel for 15 to 20 years.

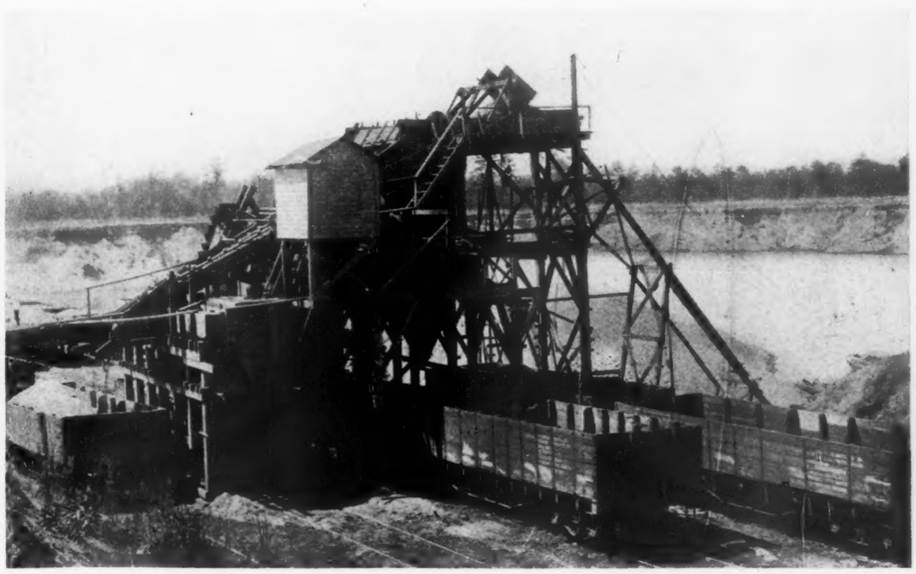
The decision to use Diesel power was made after a careful study of power costs, since current from a power company's line was easily available. The cost of an electric dredge was estimated to be about $9,000 less than the Diesel dredge, but the difference in power costs favored the Diesel dredge. The savings in power costs, it was figured, would make up the $9,000 difference in about 18 months of running and the entire cost of the Diesel dredge in about 52 months. These figures were based on an allowance of $67.50 per month for repairs, a figure which has not yet been reached in any month. Labor and other costs were taken as the same for both types of dredges.

These estimates were made by A. Mohan, the engineer of the company, and they have been borne out in practice. Both dredges are of his design and both show some unusual and interesting engineering features.

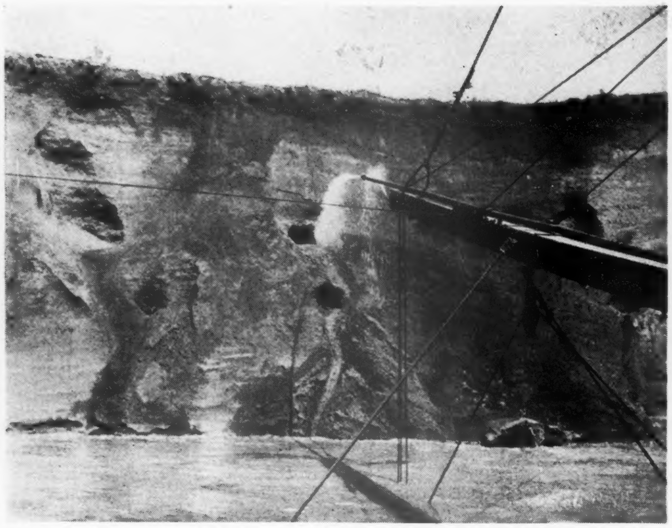
### *Designing the Dredge*

The hulls were made of wood, for experience has shown wood lasts longer than steel in this water and climate unless a steel dredge is taken out of the water and painted at periods of one to two years. Only yellow pine guaranteed 95% heart was used and the heart percentage was even higher, the timbers being selected from stock of that grade. The life of such timber under water may be measured in centuries rather than years.

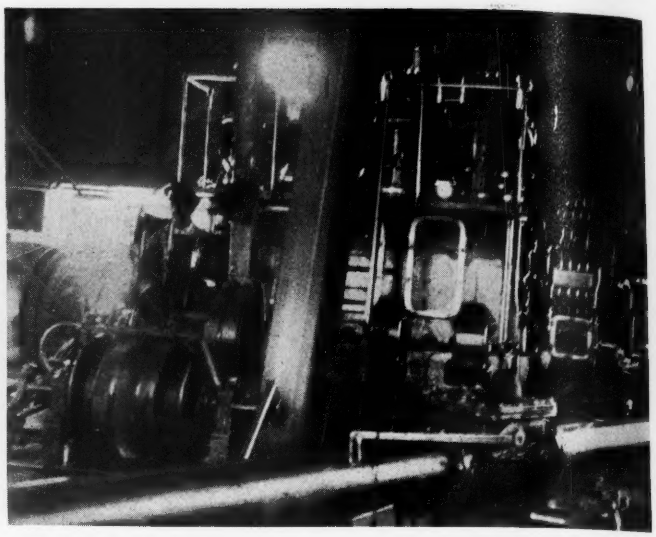
The prime essential for a hull, to bear such a machine as a Diesel engine, is rigidity, and the hull was carefully designed to secure this. All timbers were finished to exact sizes; an 8x12 was really 8 in. by 12 in. without the customary allowance for finishing. This was done so that where cribbing to support the engine was built up to match the depth of the sides there would be no occasion to shim up the difference where different depths of timbers were used. Seven longitudinal bulkheads were built in, one of solid timber, the others of timbers and bracing. The depth of the hull is such that when loaded with machinery only the rubbing timber shows as freeboard, the pur-



*General view of the washing plant at Jackson's Lake, Ala.*



*Sluicing the bank to the dredge suction*



*Four-cylinder, two-cycle engine on digging dredge*

pose being to protect the side planking and calking by keeping it under water as far as possible. There is a minimum of open deck on either dredge; the wetting and drying of an unprotected deck usually starting the disintegration of a hull. The deck is of 3-in. planking laid lengthwise of the hull.

The digging dredge has a hull 26 ft. 8 in. wide and 42 ft. 6 in. long; the booster hull is 24 ft. wide and 30 ft. long. In both cases the length was kept to the least that would admit the placing of the machinery. This was to make the hull rigid. Under the engines, cribbing of 6x10, 8x12 and 12x12 timbers was brought up from the bottom. The cribbing widens out at the bottom to distribute the load over a greater area and some of the timbers in it run from bow to stern.

In the digging dredge the engine was placed beyond the center of the boat and all the other machinery carried as far forward as possible to balance its weight. In the booster a different type of drive was used to permit the engine being placed more nearly in the center. This is considered better design and will be used if more Diesel powered dredges are built by the company.

### *Dredge Equipment*

The equipment of the digging dredge includes a four-cylinder, 2-cycle Worthington full-Diesel engine, a 10-in. pump made from parts furnished by several makers, a Clyde Iron Works hoist and a Worthington 12-hp. kerosene engine and compressor. There is a 3-in. Morris pump and a 1½-in. pump of the same make, both used for cooling water and to furnish water for sluicing the bank and for priming. Priming is by a Penberthy injector, using water in the place of steam, which forms a vacuum in the pump. An American Manganese Steel flap valve in the discharge pipe shuts off the discharge while this is being done. All the piping in the hull for the dredge discharge and suction is of fairly heavy cast iron, to resist wear for a long time. Extra pieces are kept on hand to make replacements readily and without disturbing the rest of the line, as all joints are flanged. The regular discharge pipe of the dredge is American Rolling Mills welded steel pipe made in 30-ft. lengths and connected with rubber sleeves.

The engine is rated at 200 hp., but it can be changed to 240 hp. by substituting new pistons of a type which stand a higher effective pressure without heating. This change will be made as soon as the need for more power is felt. Connection between the pump and engine is by a 24-in. endless leather belt which is held to its work by a Dodge tightener pulley. The "creep" of the belt amounted to about 3%, but since the tightener was installed there is no creep that can be determined by an ordinary speedometer. There is a Minster Machine Co.'s clutch between the engine and the belt pulley to allow the engine to start without the pump.

### *An Unusual Pump*

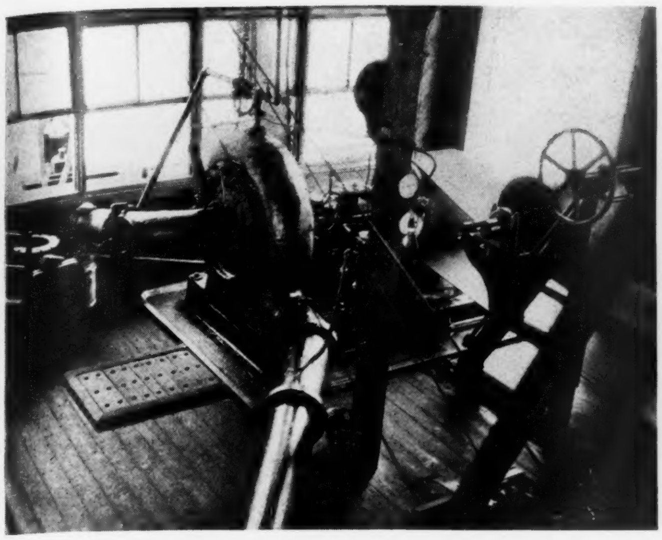
The made-up pump is an interesting machine, as it was assembled from parts each of which Mr. Mohan judged to be best fitted for the work it had to do. It has an "Amsco" shell and impeller, a Morris thrust bearing and base, and a Dodge outboard bearing to support the end of the shaft.

The base of the pump is set in a lead tray with turned-up edges, which is drained to keep any packing leakage from the deck. A connection from one of the small pumps furnishes water to keep sand away from the packing gland.

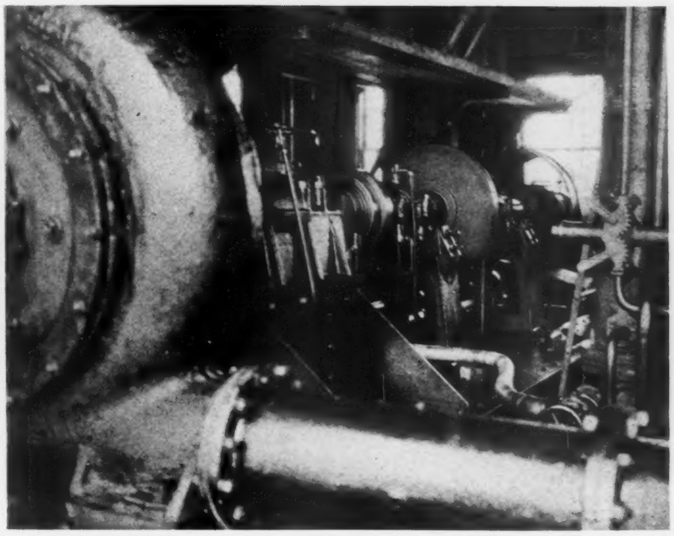
In designing this dredge everything had

*Loading tracks at the washing plant*

*Digging dredge with suction raised*

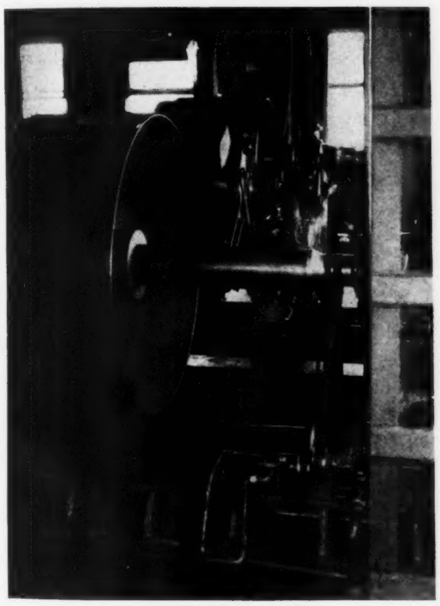


*Pump on the digging dredge*



*Booster pump made up of parts of different make*

to be set to the engine, since the greater part of the weight was concentrated in the engine. This put the pump in such a position that the discharge pipe had to be carried to one side to pass the engine. This was done by the use of two 40 deg. ells.



*Short-center drive on the booster*

In designing the booster it was decided to do away with these ells and the awkwardness of crossing the deck with a diagonal pipe. The method of doing this, adopted by Mr. Mohan after some study, was to stretch out the assembled pump so the shell and impeller come outside the engine base. This gave a straight run from the pump (which has an underslung discharge) to the pontoon line.

The pump on the booster is made up of an "Amsco" shell and impeller, a Morris thrust bearing, a Falk flexible coupling, a Cutler-Hammer magnetic clutch and the pump pulley with a Dodge outboard bearing at the end. These are carried on a special shaft made by the Allis-Chalmers Co. The base of this pump is 19 ft. 6 in. long and it is made up of structural steel members, beams and channels, and is long enough to bring the discharge of the pump beyond the base of the engine while the engine and pump pulleys are in line. Engine and pump are set on 7-ft. centers and connected by a Lenix drive, which has proven quite satisfactory in service. The Cutler-Hammer magnetic clutch has proven especially valuable for starting under the varying loads a booster pump must receive. No trouble has been experienced in keeping the pumps "in step" with one another.

### *Engines and Pumps*

The engine is a three-cylinder, 180-hp., 2-cycle Worthington full-Diesel engine of the latest type. It is fitted with an auxiliary lubricating system which is run after the engine stops to cool the bearings and pistons slowly. The regular lubricating system handles about 60 g.p.m. of oil and passes it through a Schutte-Koerting duplex strainer. Part of the oil is continuously taken out and sent through an oil filter. Lubricating oil consumption is under one gallon per 3000 hp.-hours, a little less than the maker's guarantee.

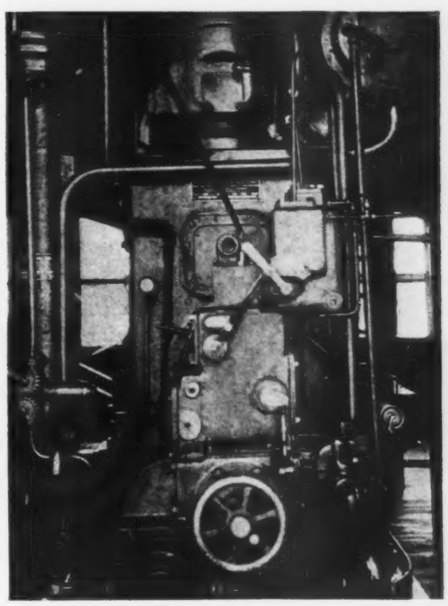
The lubrication of the pump and drive is also by a circulating system which uses a lighter oil. This is used with a Brown & Sharpe oil pump. All the oil pumps are set below the level of the oil, so they are constantly primed.

The engine uses about 900 cu. ft. of air per minute, and the intake is below the deck which ventilates the interior of the hull thoroughly. The air is drawn into the space below the deck through four pipes, one in each corner, and then goes through a Midwest air filter before it is drawn into the engine. The space below the deck acts as a settler for the coarser dust and the air filter takes out the rest, so that only grit-free air gets to the engine cylinders.

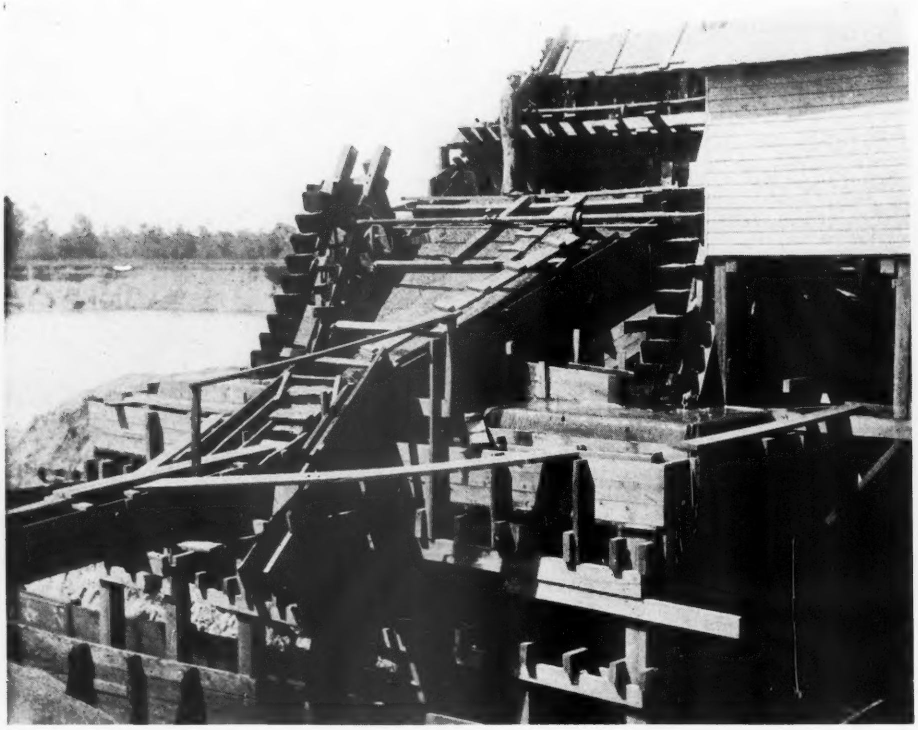
A belt from the engine runs a jack shaft from which belts drive the electrical equipment and auxiliary machinery. This shaft has three Hill clutches and pulleys for two pumps, the starting compressor, the generator and the auxiliary engine which runs the jack shaft when the big engine is not running. This engine is a 12-hp. Hill Diesel engine, made in Lansing, Mich. The electrical equipment is an 11-kw. General Electric generator, 125 volts, and it furnishes current for lights, the coils of the clutch, and for a small motor in the shore plant.

There are two Fairbanks-Morse pumps, one with a 3-in. discharge, which furnishes cooling water for the engine and water for the gland on the big pump. The other, with 6-in. discharge, furnishes wash water for the shore plant. It is connected so it can do the work of the 3-in. pump if needed.

The one accident to a Diesel engine that is seriously feared is a broken crank shaft, and a well-designed crankshaft will not break so long as the bearings are in perfect alignment. With the engines on these dredges every care is taken to keep the



*End view of Diesel engine on the booster*



*Sand boxes and dewatering elevators for settling and rinsing the fine sand*

bearings in line. When the engine of the main dredge was received a bridge gage was used to check the alignment, and the gage has been applied once a year and the result platted. Readings of the bridge gage are to 1/1000 in. and the shaft has never been more than 2/1000 in. out of alignment. It is not expected that a bearing shell will break, but the micrometered measurements of the thickness of each shell are kept and a dummy shaft is ready for scraping in a new shell, should it ever be needed.

A 4-ton Box traveling crane under the roof of the cabin was used in installing the machinery and handles repair parts. It also handles fuel and lubricating oil, which are received in drums.

The engine is always started on kerosene and run on kerosene for a short time before it is shut down. This cleans out the oil pumps and leaves everything in good condition for a start.

It may seem as if unusual care has been taken in installing these engines and in running them, but they were bought with the expectation of giving a long life of service, and the only way to make sure they give it is to prevent the arising of any conditions leading to an accident. The excellent condition of the engine on the digging dredge after three and a half years of service shows the expectation to be justified.

### *Simple Washing Plant*

The washing plant at this operation is a simple one, employing gravity screens and sand settlers. The discharge from the dredge goes against an upright grizzly which takes out an occasional piece of oversize, for there is little in the deposit that is coarser than 2½-in. diameter. The discharge next passes on a fanning table, which spreads it, and then goes through a ⅜-in. upright screen. Afterwards it strikes a baffle to reverse its direction and goes through a sand screen. The oversize products of the two screens are gravel in mixed sizes and pea gravel.

The undersize of the sand screen goes to an 8-ft. Allen cone. There are three of these installed, but one is usually found sufficient to settle the concrete sand. The overflow from the Allen cone goes to two hoppers, each of which is fitted with a dewatering elevator. These lift the sand and both discharge into a center hopper which is fitted with clean water from the 6-in. pump on the booster. The rinsed sand is discharged at the bottom into cars and all overflows from these hoppers go to waste. There are no bins. Four tracks under the plant allow cars to be placed to receive gravel, pea gravel, fine sand and coarse sand, all the products of the plant.

The "housekeeping" at this plant, especially on the dredges, is exceptionally good. This is partly for appearance sake but more as a guarantee that the machinery will be looked after. Only the men whose work required it are allowed to go on the dredges.

The company does a large retail building material supply business in Birmingham and had just completed a new storage yard when this was written. Besides a large warehouse for cement and plaster, there is an open yard for clay and concrete products and a sand storage. This contains four Blaw-Knox circular steel bins, each holding a carload, and two concrete bins holding about 50 carloads, as a reserve. Material is handled in and out of storage by a Brownhoist locomotive crane.

The officers of the company are: R. N. Hawkins, president; P. E. Chalifoux, treasurer, and A. Mohan, secretary.

## Muscovite Mica Co. to Operate

MICA property which has been inactive since 1914 will soon be producing again when the Muscovite Mica Co. opens its recently acquired mine near Troy, Idaho. The mine was formerly owned by Peck Brothers of Chicago and leased to W. H. Sills of the Producers Mica Co., but litigation prevented the operation of the deposits. The Muscovite company bought the mine from the Peck estate early in 1927 and immediately began driving a 600-ft. crosscut toward the deposit at a depth of approximately 200 ft. below the old workings. It is estimated that the new tunnel will develop about 5500 tons of mica, of which approximately 12% will be available for sheet mica.—*Mining Truth.*

*Unloading cars to truck bins in the Birmingham yard*

*The Williams Lime Manufacturing Co. plant at Knoxville, Tenn.*

# Coal-Fired Shaft Lime Kilns Converted to Producer-Gas Firing

## Williams Lime Manufacturing Co., Knoxville, Tenn., Using Waste Marble for Making Chemical Lime Gets One-Third Better Fuel Ratio

KNOXVILLE, Tenn., is the center of a considerable lime industry, the kilns burning the waste from the marble quarries for which this city is famous. Most of the kilns are of the "three-eye" and "four-eye" type (that is, they have three or four single-eye fireboxes), long a standard in this part of the country.

The Williams Lime Manufacturing Co. plant has now been operating three years, although it has been considerably changed from its original design. The kilns were originally standard Arnold & Weigel coal-fired kilns. The production with coal was 8 tons of lime per kiln per day. About a year after their erection the kilns were changed over for firing with producer gas, and the output per kiln was increased to 14 tons per day without increasing the fuel required.

The firing is from a 10-ft. Morgan gas producer driven by a 3-hp. General Electric motor. Egg coal from Harlan, Ky., is used as fuel and it has about 13,000 B.t.u. heat value and a low ash content. It is considered to be a very satisfactory fuel, especially from the way it works in the producer without caking. A 35-hp. boiler set to one side of the producer furnishes the necessary steam. The fuel ratio of 4 to 1 includes the coal used for firing this boiler.

The manner in which the gas from the producer is fed to the kilns is a unique feature of this plant. The pipe from the producer goes into a bustle pipe which passes over the fireboxes. This pipe is rectangular in section, 3 ft. high and 4 ft. wide. A round pipe would have been installed if the space above the fireboxes had permitted, but the rectangular section works very well. Flues about 18 in. long extend down through the tops of the old fireboxes to the eyes of the kiln, which is an unusual way to admit gas. All the air for consumption comes up through the cooling cone below, the old doors on the firing level being sealed tight.

*The nearby marble quarry whose waste rock is burned for lime at the Williams plant*

Ordinary sliding gates admit the gas from the bustle pipe to the kilns, and no pressure instruments are used to see that the gas is equally divided. Experience shows the man in charge how to set these gates, and once set they do not often have to be adjusted.

### *Breaking Up Waste Marble for Kilns*

The Knoxville Marble Co.'s quarry from which the stone is obtained is near the plant, and the cars loaded with the quarry waste have only a few hundred feet to go to reach the lime plant yard. The waste is not in spalls but in big pieces which often weigh several tons. The first operation necessary is to reduce them to kiln stone size.

The regular method of breaking these large pieces in this district (where all the kilns but one work on marble quarry waste) is to break them by dropping a heavy steel ball. However, at this plant block-holing and shooting with small charges of dynamite is the method used.

Dropping a steel ball looks to be cheaper than drilling a hole and shooting off a charge of powder, but there is more to it than that.

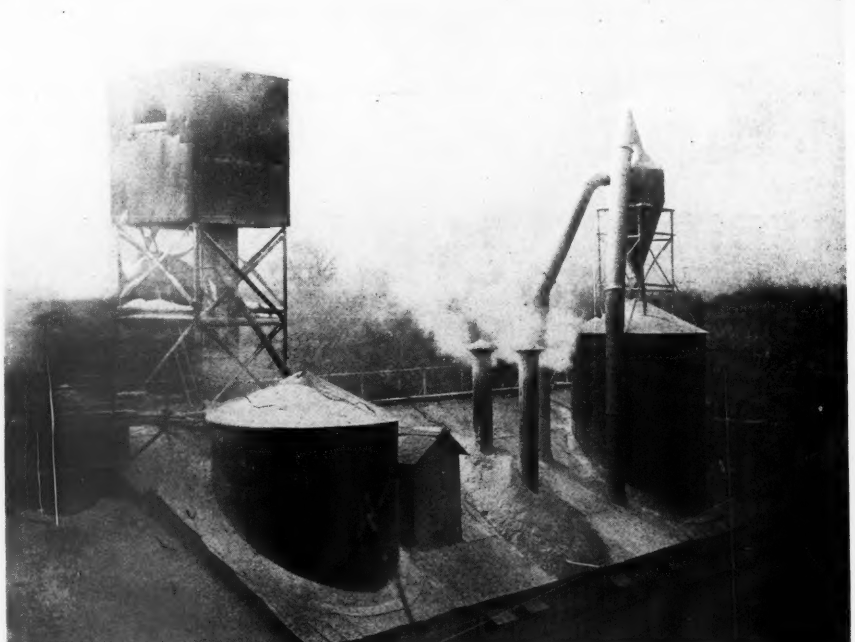
*Larger pieces of waste rock are broken down to kiln size by pop shooting*

*Core is carried by the derrick pans to the yard level and mixed with cars of kiln stone*

Several men are employed in the yard sorting stone and loading cars, and every time the steel ball is dropped they all have to "hunt cover," as pieces fly from "steel-balling" about as badly as they do from popshooting. This constant running to safety interferes with the regularity of the work. Popshooting can be done at noontime and after the men have quit for the day, and a number of holes can be shot at once.

Pieces so large that they cannot be removed from the car until they are broken are split by drilling and wedging. Sledging is used to break the larger pieces, which result from popshooting, down to kiln size. The ideal kiln size, according to G. F. Curtin, the manager, is "the size of a man's head, and preferably the size of a small head." In other words, from 7 to 9 in. in diameter. Spalls are wasted and used for filling around the plant. There are not many of them.

The kiln stone is loaded in special cars, made by Sanford and Day, holding three tons, which are pushed by hand over a track that runs beside the kilns. The kilns are 40 ft. high over all

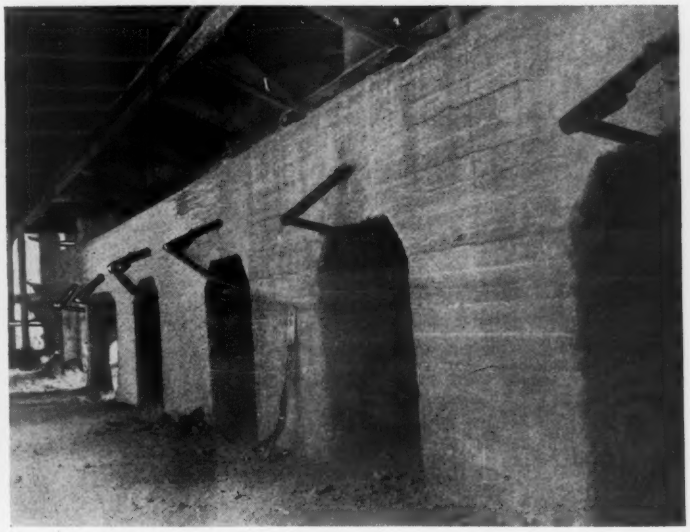


*Air separating system for hydrated lime, on top of the hydrating plant*

*The yard and track to the charging floor*

*The kiln house and hydrating plant at the extreme left*

The firing floor. The square pipe above the fire boxes conveys the gas to the kilns



The lime drawing and cooling floor. The draw shears are hand operated

and 28 ft. from the firebox up. The shell is 11 ft. in diameter. These kilns are shorter than they should be for producer gas, according to Mr. Curtin, and it is proposed at some future date to add 16 ft. to their height, which, it is believed, would somewhat lower the fuel ratio. Nevertheless, the 1 to 4 fuel to lime ratio now obtained compares favorably with the best present practice of the industry, and the change would be expensive to make, as it would involve the installation of equipment to raise the stone to a higher charging floor.

Any core remaining on the drawing floor is brought out and lifted by the yard derrick to the yard level in a pan. This pan is emptied into one of the cars as it is being filled. No trouble is found in burning the core mixed with the stone in this way.

### Drawing and Loading Lime

The draw shears of the kiln are of a standard manually operated type. The discharged lime is cooled on the floor and loaded into railways cars if lump lime is to be shipped. But not so much of the output is shipped today in lump form, the greater part being sold either as pebble lime or as hydrate.

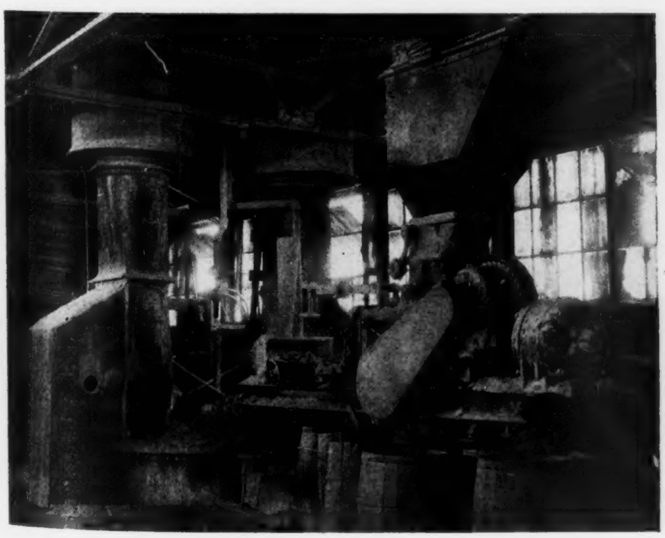
### Making "Pebble Lime"

To make these the lime is sent to an 18-in. conveyor 80 ft. long which runs under all the kilns and which empties into a small hopper above a Sturtevant No. 2 gyratory crusher. The crusher discharge goes to a chain bucket elevator, 70-ft. centers. from which it falls into a rotary screen with 1-in. round openings. The oversize of this screen is pebble lime and it falls into a steel silo 14 ft. in diameter and 30 ft. high. Below this is a sacker for packing in waterproof paper sacks and the usual arrangements for loading into barrels.

### Fines Are Hydrated

The undersize of the screen falls into the bin for the hydrator feed, which is 30 ft. high and 18 ft. in diameter. A short screw conveyor takes the material from this bin or tank to a second chain-bucket elevator which lifts it to a Schaffer poidometer. This is used as the feeder for a Schaffer hydrator.

G. F. Curtin, manager of the plant



Poidometer and upper part of the hydrator

Motor and fan of air separation system

The hydrated lime goes by a screw conveyor to a Raymond mill, and from this to a standard Raymond air-separating system. The rejects discharged from the mill, amounting to a few cars yearly, are sold for agricultural purposes. The hydrated lime is sacked by a Bates valve-bag sacker and loaded either into the storeroom or directly into the cars.

The larger part of the output of the plant is sold for chemical lime and finds a market with paper mills, water purification plants and the like. There is also a good local demand for this lime for building purposes.

The manager of the plant is G. F. Curtin, who was formerly with the Farnam-Cheshire Lime Co. of Cheshire, Mass. He is a chemical engineer and a graduate of Sheffield Scientific School, Yale University. It is unusual to find a young man with a chemical engineer's training deliberately choosing the lime business, but Mr. Curtin is of the opinion that it offers one of the best fields for development in the industries of the country.

# Operating Expenses of Building Material Dealers

## Report Based on Detailed Returns from 203 Dealers in Various Parts of the Country

THE Bureau of Business Research, Harvard University, Soldiers Field, Boston, Mass., has recently completed and published in bulletin form a study of the operating expenses of building material dealers (Bulletin No. 64, price $1.50). The report is based upon a study and analysis of very detailed returns from 203 building supply dealers in various parts of the country. The investigation was made possible through the generosity of the Atlas Portland Cement Co., New York City, which bore all the expenses of the survey.

Undoubtedly this report will prove valuable to every progressive dealer, and as many crushed stone, sand, gravel, slag and lime manufacturers are also dealers to some extent, the list of those interested probably includes many readers of ROCK PRODUCTS. The following general summary, at least, will prove interesting to cement, lime, gypsum and other rock products manufacturers who have business relations with building material dealers:

"The figures presented in this bulletin are based on reports from 203 building material dealers covering their operations for the fiscal year 1926. These 203 firms were located in 33 states. The aggregate net sales of the entire 203 firms amounted to $79,456,611, the sales volume of individual firms ranging from about $10,000 to over $4,500,000.

"The following general summary states some of the more significant points indicated by the study of the operating figures of the 203 building material dealers reporting their 1926 figures to the bureau:

### Significant Points

"1. The common net profit of building material dealers in 1926 was highest for firms handling primarily mason materials—2.8% of net sales—and lowest for dealers handling primarily lumber—0.3% of net sales.

"2. Building material dealers handling primarily mason materials had also the lowest common figures for gross margin and for total expense. The common gross margin for firms specializing in mason materials was only slightly lower than for firms handling other merchandise, but the total expense of these firms was almost 2% of net sales lower than for any other group, according to type of merchandise, and almost 3.5% lower than for firms dealing predominantly in lumber.

"3. The firms which earned the largest net profits did so in general by virtue of smaller total expense in proportion to net sales rather than by higher gross margin. In other words, high profits usually were made possible by low total expense.

### Stock-Turn, Delivery and Advertising Expense

"4. The rate of stock-turn was highest for dealers handling primarily mason materials or mason materials and coal, and lowest for dealers handling primarily lumber. The typical rate of stock-turn for lumber dealers was found to be 2.8 times a year, whereas for most of the firms handling mason materials or mason materials and coal it was more than 10 times a year.

"5. Delivery expense in proportion to net sales was lowest for dealers handling primarily lumber and highest for dealers handling primarily mason materials and coal. For the latter type of firm, total delivery expense commonly amounted to 9.6% of net sales. Delivery expense both for lumber and for mason material dealers commonly was found to be higher for firms located in the larger cities.

"6. Advertising expense typically was lowest for firms handling primarily mason materials—firms of this character commonly spent only half as much in proportion to net sales for advertising as did the firms handling primarily lumber.

"7. All salary and wage items except delivery wages commonly were higher for the lumber firms than for dealers in other types of building materials.

"8. Lumber firms having a stock-turn of three times or over a year commonly had substantially lower total expense than did lumber firms whose stock-turn was less than three times a year. The groups of lumber firms having the higher rates of stock-turn, moreover, commonly made a net profit of 2% of net sales, whereas those turning their stock less than three times a year commonly sustained a loss of 1% of net sales. Groupings according to rate of stock-turn were not made for the other types of dealers because the rates of stock-turn for them were not comparable.

"9. Expenses in general were lowest for the firms which had relatively large sales volume; the net profits for the large firms also were commonly greater than for the small firms. These tendencies were particularly noticeable for the groups of firms specializing in lumber and in mason materials.

"10. For dealers concentrating on the sale of lumber, both total expense and gross margin commonly were higher in proportion to net sales for firms in the larger cities than for those in the smaller cities. In the case of firms for which the sales of mason materials predominated, however, the tendency was slightly in the opposite direction—total expense and gross margin both being commonly a little lower for the mason material firms in the larger cities than for those in the smaller cities.

"11. Rent expense showed no important variation according to type of merchandise handled. Among lumber firms, however, rent expense was notably lower for the firms having relatively high rates of stock-turn; and for both lumber and mason material firms it commonly was lower for the firms which had the highest net profits.

### Taxes and Insurance

"12. Taxes and insurance commonly were highest in proportion to net sales for dealers who handled primarily lumber or a large proportion of lumber along with other lines of merchandise. The expense ratios for these items were lowest for firms handling mason materials, or mason materials and coal. Insurance expense for firms handling coal in addition to mason material was, however, higher than for firms handling primarily mason materials alone.

"13. The 25 reports received from line yard firms revealed no marked differences in the expense and profit figures of such firms as compared with the figures of firms operating unit yards. Although there were variations in individual expense items, the common figures for total expense, gross margin and net profits for these line yards were all within the ranges found among the five major merchandise divisions into which the reports were grouped.

# Present Status of Portland Cement and Possibilities of "Super" Cements*

By P. H. Bates
U. S. Bureau of Standards, Washington, D. C.

FIFTY years ago portland cement reached such an importance in industry that certain ones, interested in the interchange of information and the further development of this commodity, formed the Association of German Portland Cement Manufacturers. This anniversary not only commemorates this fact but it also marks a period when new ideas regarding portland cement and its uses have come to the fore in a manner never so strikingly accentuated as at the present. While this may seem to be more true of the conditions in the United States than in Europe, yet the more exacting demands of the cement or concrete technician in Europe as to quality indicate a marked similarity of trend on the two continents.

There is no doubt that this is due partly to the service that concrete has given and partly to the bringing onto the market of a cement (high in alumina) which develops its maximum strength in a very short time. The constructing engineer has never been too well pleased with the lack of positive evidence of what the concrete which he happens to be making will be some time after his structure will have been put into service. The empirical tests of cement are not convincing of what will be the character of the cement when it will be used. The possible delay to construction incidental to the making of preliminary tests of concrete have sometimes influenced the designing engineer to specify alternate materials. Hence the appearance on the market of a cement which will show its maximum values even in concrete in a day or two has of necessity made the engineer query why portland cement could not be developed or modified into having similar desirable qualities.

Portland cement concrete has been used in so many cases and under such widely varying conditions that inevitably it has gotten into uses which are decidely against any assurance of marked longevity of life. The too widely accepted idea that concrete would be permanent under any and all conditions has been found to be erroneous. In the course of a half century there has arisen a certain amount of distrust that has resulted in bringing forward panaceas purported to cure all possible troubles. In some instances there has resulted the disuse of concrete. But more properly in other cases there has resulted a desire to study this commodity and determine its possibilities and its limitations.

### Europeans Pushing Development of Early High-Strength Portland Cements

This is, however, in general a healthy condition, and when manifested by the desire to study and then proceed according to the results of the study it should be particularly fostered by all interested in the cement and concrete industry. That this attitude of the constructing engineer has in one respect been recognized and a movement made to meet his wishes is shown by the appearance on the market of so many brands of high early strength portland cements. This is more marked in Europe than in the United States. It is rather an unusual situation that the younger group should be less radical than the older. But nowhere has a single standard of portland cement become more strongly entrenched and adhered to than in the United States. Europe has continuously been accustomed to hydraulic limes, natural cements, eisen-portland cements, hoch-ofen cements, puzzuolana cements, etc., whereas in the United States anything other than standard portland cement is hardly an obtainable commodity. The American engineer has not shown much more than a desire to become acquainted with this quick-hardening cement and is inclined to leave the first uses to his more adventurous colleague.

However, the maufacturer has been alert to the situation and intensive study of cement has never been more active than at the present. Naturally the question arises as to what direction the study should take and how can portland cement be given especially the property of acquiring all of its desirable qualities in a minimum time. Fifty years have passed since the organization of the Association of German Portland Cement Manufacturers and 100 years since portland cement became a definite commercial product. Hence it seems strange that it is not clearly known what are the most desirable qualities that cement should have to give the proper service or yield an adequate return on the investment in the product in which it is used. It should be noted that no reference is made to the permanence of concrete or other products made from cement. This infinite longevity of life is demanded in such few cases that it may be ignored. It is an ideal, but an ideal that should not be used in advertising propaganda. Portland cement products are in general as permanent as any other commodities with which they come into competition—in fact, in the majority of cases they have longer life. But in any case cement has justified its use when it gives a better return in service for actual investment made than its competitors.

### Present Tests No Real Criterion

Unfortunately, however, the property which is used in evaluating a cement or concrete for any and all purposes is strength—in the case of the former, generally tensile, and in case of the latter, compressive strength. But we have too little data to show that tensile or compressive strength is the criterion upon which depends all the needed properties of this material. In many instances we are just as much or possibly more interested in resistance to weathering, or to the action of salt solutions, to constancy of volume under alternate wetting and drying, low coefficient of thermal dilation, minimum volume changes during setting and hardening, and tensile or transverse strength of concrete. Even in the case of the tensile strength of cement it is not generally agreed as to what constituents or compound in cement confers this quality. More concisely, there is no agreement as to what are the constituents in portland cement or how they react with water.

But the situation is not quite so chaotic as it appears. In examining cement clinker all note the same constituents, some give them one set of names, others give them another. There are two main differences of opinion as to what each constituent is, but there is general agreement as to what general plant procedure and composition of raw materials must be used to produce any one constituent in normal amount. There is division of opinion as to what compound results when water is brought into contact with cement, but there is no agreement as to the magnitude of the tensile strength that will result from the hardening of any cement characterized by predominance of one or others of the differently named constituents.

### High-Lime Portland Cements

It is just about as universally agreed that the constituent highest in lime confers the early setting and hardening as it has been

*Specially prepared for the 50th anniversary celebration of the German Association of Portland Cement Manufacturers.

[1]While I am thoroughly convinced that in the high lime cement the major constituent is the compound $3CaO \cdot SiO_2$, and $2CaO \cdot SiO_2$ the next in importance, it is not necessary or even desirable at this time to present a discussion as to why I believe these to be the facts.

tacitly agreed by investigators to give this constituent a variety of names[1] and assign it a variety of compositions. But while the high strength at early ages may be desired, is it known as definitely as it must be that this constituent or high strength is conducive to resistance to sea water or the needed constancy of volume under all conditions as is required for road construction? So far as sea water is concerned there seem to be three opinions: First, use the high lime cement and obtain the high strength which will be sufficient to resist the disruptive forces of expending decomposition products; second, use the high lime cement, but add trass, tufa, slag, etc., to combine with the large amounts of lime set free during hardening; third, use a low lime-high silica cement. So far as constancy of volume is concerned there is no well-defined opinion.

But if it is assumed that for best results in the average a cement containing the maximum amount of the high lime constituent is desirable, is it possible to modify present manufacturing conditions to attain such a result? It is of course assumed that finer grinding of the clinker is carried to a high degree to obtain the maximum results from the amounts that may be present under any conditions. The lime content can be raised to the limit that will permit of obtaining chemical combination at the temperatures and during the time of burning that the kiln and economy will permit.

### *Raising the Lime Content*

By a corresponding decrease in silica without changing the iron or alumina a marked increase in the amount of this desired constituent will result. It is but a matter of calculation to show that if we are so bold as to assume that this constituent has the composition $3CaO{\cdot}SiO_2$ and that the iron and alumina remain constant, then each decrease of $SiO_2$ by 1% and corresponding increase of lime will increase this constituent by a little more than 11%. Thus if two cements both contain 8% $Al_2O_3$ combined as $3CaO{\cdot}Al_2O_3$ but one contains 22% $SiO_2$ and 70% CaO while the other contains 23% $SiO_2$ and 69% CaO, then the former might contain 65.1% $3CaO{\cdot}SiO_2$ and the latter 53.3%. Furthermore, the presence of iron oxide replacing part of the alumina would increase this percentage while decreasing the difficulty of burning. The limiting condition to such lime increases is the temperature and time of burning obtainable in our kilns, regardless of their type. However, it would seem that our rotary kilns are more inadequate in this respect than other types in that their economy falls off much more rapidly as we approach this hypothetical optimum lime content. If the proper kiln could be developed, then it would be possible in the above case to attain a lime content slightly in excess of 71% before there would be an excess over that required to form this sometimes-believed-in compound, or in excess of that amount which can exist in solid solution in the dicalcium silicate.

### *Effects of Magnesia*

Magnesia is another constituent of cement which in moderate quantities materially increases the formation of high lime constituent and bring this about at lower temperatures But the presence of magnesia has always been a disputed point and it has been more avoided than sought after. Generally the high test portland cements of Europe are characterized by a MgO content from 1% to 3% lower than those of the United States. It seems also that the average MgO content of European cements in general is about that much lower than the average in the United States. The reason for this is solely that of the composition of the raw materials. We might therefore conclude that the similarity of products as measured by strength indicates that a very low magnesia content or its presence up to 4% or 5% is immaterial were it not for the fact of the physical difference of the raw materials. It is hardly proper to compare the low magnesia, almost amorphous, chalks so much used in coastal Europe as raw cement materials with the hard crystalline limestones containing considerable magnesia from which the majority of the cements in the United States are produced. Indeed, it would appear that the ease of burning these European raw materials is largely a question of their physical degree of fineness. But on the other hand the magnesia content of the limestones of the United States assists materially in bringing about the proper reactions in the kilns within reasonable temperatures and times.

While the work[2] carried out at the Bureau of Standards a number of years ago rather thoroughly covered, in certain phases, the replacing of lime in cements by magnesia, it did not cover this point of the relative ease of making and relative value of the two groups of cements in both of which a number of cements of the same silicate and hydraulic moduli would be used, but in one group the raw materials would contain less than 1% MgO and in the other the MgO would be present in amounts from 1% to 5%. It would be preferable in such an investigation to use throughout as a source of "lime" a low magnesia chalk and secure the desired magnesia content by the addition of amorphous magnesite.

While in the work referred to by the Bureau of Standards an effort was made to note with what the MgO had combined in the course of burning the cement, the information was not conclusive until high percentages were obtained. Thus at about 7.5% MgO there was noted the mineral monticellite—$MgO{\cdot}CaO{\cdot}SiO_2$; and at 10% spinel—$MgO{\cdot}Al_2O_3$. In passing it might be of interest to call attention to the fact that magnesia in high alumina cements forms spinel, and consequently as the magnesia content in this type of cement increases, the amount of spinel, very largely insoluble in dilute hydrochloric acid, increases.

[2]Technologic Paper 102: Bureau of Standards: The Properties of Portland Cements of High Magnesia Content.

### *Iron Oxide*

The only other compound in portland cement raw materials which may materially affect quality as usually measured is the iron oxide. Here again more investigative work should be carried out. However, in general, increasing the iron oxide assists in producing the high lime constituent, but it should be borne in mind that a high limed raw mix is also required. The introduction of more $Fe_2O_3$ at the expense of $Al_2O_3$ in a low lime mixture is of little value except in lowering the clinkering temperature. In such mixtures the use of much $Fe_2O_3$ will soon cause kiln troubles through the formation of large, slow-moving clinker, rings in the kiln, and conditions in general which materially reduce the output. In fact, any marked change in the present amounts of any of the oxides in the raw material to produce high early strength must be accompanied by the use of maximum amounts of lime. Nothing of moment can be gained otherwise. This is of course aside from the value which may accrue from fine division of both raw materials and the resulting cement, both of which are of primary importance in the question of super-quality cements.

### *Quick-hardening Cements Other than Portland Cement*

There remains the possibility of a high-testing cement of markedly different composition from either that of portland cement or high alumina cement. Here the governing factor is solely that of lack of wide distribution of raw materials and consequently there would result excess costs of the production. Magnesia-oxychloride, zinc-oxy-phosphate, alumina silicate-metaphosphoric acid, and litharge-glycerine all form most excellent quick hardening cements and could be used in many places where portland cement is now used. But the lack of a ready and extensive source of raw materials has very much restricted their development except for certain very special cases. The same condition in respect to bauxite is limiting the use of high alumina cement, and will limit any marked deviation from the present composition of portland cement. The suggestion of a marked increase in iron and alumina and an equal decrease in silica is excellent and produces an excellent cement, but not so much better than portland that it will ever have a large market. This results solely because the available clays or other sources of iron or alumina tend to be decidedly silicious rather than aluminous. The obtaining of a clay containing somewhat more iron and alumina than silica is not impossible, but the distribution of such clays is quite limited and they have an outlet in other industries which can afford to pay more for them than the portland cement industry can.

### *The Barium Compounds*

The Bureau of Standards has recently repeated some of Le Chatelier's work on the barium silicates and conducted also some

original work with the barium aluminates. It found $2BaO \cdot SiO_2$ to have marked hydraulic properties, but with time there was such a growth of crystalline hydrated products in mortar specimens stored in water that disintegration resulted. The barium aluminates were even more interesting than the barium silicates. When barium carbonate and alumina were calcined together at 1500 deg. C. in the molecular proportions of $BaO \cdot Al_2O_3$ there resulted a very remarkable product (it is not known at the present if a definite compound was obtained) which reacted with water even more energetically than $CaO \cdot Al_2O_3$ or $3CaO \cdot 5Al_2O_3$. It set in the neat condition with the formation of a jade-like mass which just before set was reached showed marked syneresis. Later the clear solution which had appeared during syneresis turned to a soft, opaque mass. If an excess of water was used in agitation for about three-quarters of an hour, a quantity of this product, a clear solution, could be obtained on filtering. This in the course of 24 hours congealed to a beautiful white paste. This again in the course of a month or two showed syneresis. If a thin paste of the aluminate and water were prevented from setting by mixing and the addition of slight amounts of water, a very sticky paste was obtained. When tested between the fingers this had almost as much adhesion as a good animal glue. Unfortunately, however, after drying in a dry atmosphere, it will in a moist atmosphere absorb water, swell, and lose all of its adhesive properties. This work is cited solely to show the interesting properties of combinations of several common oxides and arouse interest in the determination of the setting and hardening qualities of the other available oxides. It should be borne in mind that there are many cases where portland cement is not the ideal and where more would be willingly paid for a more satisfactory cement.

### *Relation Between Strength and Durability*

The great advance in the use of portland cement is not due to the fact that it has the ideal properties for so many of its applications as it is due to the wide distribution of abundant raw materials which will quite readily and cheaply make a commodity which permits of great latitude in its handling in use without producing unsatisfactory results. Its use has now advanced to a stage that special demands are being made, and for such demands special prices are not prohibitive. But in such cases other considerations than strength alone or strength at certain ages used in testing cement are to the fore. Durability of resulting product is the broad term now used to cover an assurance of satisfactory life that is being demanded of cement. Unfortunately, data are not available which will definitely show the needed relation between strength at any age and durability under all conditions of prospective use. This applies equally well to high alumina and portland cement. The use of the former has focused attention on high early strength, but this quality is needfully demanded in but a few special cases, and for such demands a commodity is at hand at an advanced price. Durability in sulphate-bearing water is another special demand made of hydraulic cements which is still to be met, and, again, when it is met it will undoubtedly be found in a special cement costing more than portland cement. Such considerations should be an incentive for studies of the hydraulic properties of all possible combinations of the fairly widely distributed oxides. It is a sad commentary on the portland cement industry and the technical and scientific interests in it, in general, that there should have been such a wide lapse of time between the first appearance on the market of portland cement and the realization of the properties of the closely associated, in composition, alumina cements.

### *Study Required to Develop Catalyzers or Accelerators for Portland Cement*

When discussing the improvement in portland cement one should never lose sight of the possible improvement in its use. Reference is not made here to studies in the amounts of water to be used in making concrete or to the proportioning of aggregates, but solely to a greater development of the protential properties of the cement itself. All are familiar with the fact that the mechanism of hardening is not only slow but incomplete, especially when compared with the high alumina cement where it is rapid and goes relatively much further towards completion. A most excellent line of research would be in the field of the development of accelerators or catalysts which would hasten the reaction of the lime silicate with water. The alumina silicate dental cements are inert towards water, but in the presence of solutions of metaphosphoric acid there is rapidly formed a very high strength cement. The use of solution of calcium chloride with portland cement is increasing rapidly, solely on account of the higher early strength developed. But this is far from what must be the ideal cataylst for this purpose. In the course of such studies, of necessity, widely varying compositions of cement must be employed. Covering such necessarily wide ranges of composition may show that again a high lime cement is not wanted for catalyzing, but rather a high silica cement. The character of the formation of the lime freed from the compounds of normal portland cement indicate immediately the desirability of low lime composition. For even if the catalyst should enable normal portland cement to give off more lime in any period of time, the hydrated lime is not of the required gelatinous character that is needed for a good bonding agent. A reaction product having the physical characteristics of the reaction product of high alumina cements is more like the ideal. What little can be seen of the character of the hydrated low-limed silicate of portland cement indicates that it is the ideal inorganic glue, especially when accompanied by the absence of crystalline or amorphous hydrated lime. The problem then is to have this form through the agency of an accelerator or catalyst from a relatively high silica low-limed portland cement. This should be given preference to hoping to develop a reaction product of similar physical form from a cement of entirely different composition, such as a very high iron cement, solely, again, on account of the availability of sources of raw materials.

### *Improvements Yet to be Made*

There is no doubt that portland cement can be further improved. All have seen the marked improvement attempted by a number of manufacturers since the appearance on the market of the high alumina cements. The remarks here given have emphasized certain directions in which studies should be made to determine the maximum possible improvement. These suggestions are not new but are reiterated solely for the purpose of emphasis and with the hope that ultimately sufficient interest will be aroused to have the studies made. However, in making these studies, the economy of the improvement must always be kept in mind. Unless the resulting product has materially more valuable properties, no markedly greater price can be paid for it. But in addition to the problem of improving portland cement there is that of determining the likelihood of combination of other naturally occurring oxides having more valuable properties. Here, again, the value of these to the consumer will depend solely on how much more valuable they are than portland cement. They will inevitably cost more on account of the lack of raw materials, for there are no more uniformly distributed raw materials than the low-grade limestones and clays required for portland cement manufacture. But the market will stand a higher priced cement, provided it has enhanced properties.

### *Present Tests Not Fully Indicative*

Before closing, one more thought should be emphasized. This relates to the crudeness of the present tests for evaluating portland cement. Those who have been testing the new quick hardening cement or who have been more critically examining the portland cements have had brought home to them the striking inadequacy of the present methods. They are empirical, lack sensitiveness, precision and accuracy, and fail practically completely to bring out differences which even a second-rate workman will notice on construction work. The tendency to test cement solely to see if it passes certain requirements which have little or no relation to the demands which will be placed upon it should give way to methods which will evaluate the cement for the purpose for which it is to be used. For example, even today most portland cement is accepted upon the tensile strength of a mortar specimen. Hence in testing the high alumina cements the same

procedure is too generally followed. Therefore, much to the advantage of the portland cement, it is found that the new cement is but little stronger. However, compression tests of mortars of the latter show it is more strikingly stronger than the portland, and finally, when concrete specimens are tested at *twenty-four hours,* there is obtained the true idea of the difference in the two cements. But neither of the three tests are indicative of volume changes, thermal dilation, durability, or any of the properties which are being more thought of in the use of cements for special uses. There must be more thought and work devoted to the development of the proper tests of cement. This is especially true in connection with studying the improvement of portland cement or the possibilities of special cements. With the present tests it is not possible to definitely know whether portland cement has been improved or whether a special cement of some particular value has been produced.

# Effect of Quality of Cement Upon Strength of Concrete

A REPORT on tests conducted jointly by the Michigan State Highway Department and the U. S. Bureau of Public Roads, by F. H. Jackson, engineer of tests, Bureau of Public Roads, is contained in the August issue of *Public Roads,* official publication of the Bureau of Public Roads. The following extracts are of particular interest:

### *Factors Influencing Quality of Concrete*

"During the last several years portland cement concrete has been the subject of a great deal of study. Many tests have been made to determine the effect of such factors as quantity of water, quantity of cement, character and gradation of aggregates, etc., on the quality of the product. However, the effect of the quality of cement upon the quality of the concrete has received very little attention, the tacit assumption being, apparently, that any variations in the quality of the cement would be of relatively small importance, in so far as the quality of the resulting concrete is concerned, provided the cement passed the minimum requirements of the American Society for Testing Materials.

"The results of tests made jointly by the Michigan State Highway Department and the Bureau of Public Roads at the Ann Arbor laboratory of the former during the summer of 1926 and presented in this report show that such an assumption may not hold under all conditions, and call attention to the desirability of studying those factors, including the cement, which affect the rate of hardening of paving concrete.

"Although the number of specimens subjected to tests was not large enough to justify general conclusions, their remarkable consistency points strongly to the probability that the strength of concrete in tension, flexure and compression varies directly with the tensile strength of standard 1:3 mortar briquettes made of the cement and Ottawa sand. They indicate also that the strength of a concrete pavement at the end of the customary curing period may or may not be as great as the assumed strength, depending upon the character of the cement used, all other elements being the same.

### *Tensile and Flexural Strength of Concrete of Significance*

"It is now quite generally recognized that the tensile and flexural strength of concrete are of more significance than the crushing strength in determining the value of the product for use in pavement construction. Moreover, modern methods of design utilize the flexural strength of the concrete as a basis for calculating the thickness of pavement necessary to carry the maximum loads which will be allowed upon it. Unless traffic is restricted the maximum load is just as apt to come upon the pavement the day the road is opened as at some later period. Therefore, the critical strength of the concrete is the strength which it has attained at the time traffic is allowed upon the pavement. Any increase in strength which the concrete may attain subsequently should, in general, be considered only in the light of an additional factor of safety and should not be utilized in design. This, of course, assumes that there will be no retrogression in strength at any later period. The rate of hardening, therefore, becomes an important item and should control the time necessary to keep the pavement closed to traffic.

### *Effects of Variations in Cement Quality*

"It was for the purpose of determining the effect of variations in the quality of certain portland cements used in the state of Michigan upon the strengths of paving concrete at the end of the curing period, as well as the relative rate of increase in strength up to and subsequent to this critical stage of the pavement's history, that the co-operaive investigation was undertaken.

"All concrete specimens used in the study were of the standard paving mix used by the Michigan State Highway Department, which is 1:2:3½ by volume. The only variable was the quality of the portland cement, of which three grades were used—a slow-hardening grade with a briquette strength averaging about 200 lb. per sq. in., a grade of medium strength running about 250 lb. per sq. in., and a cement of fairly high early strength testing approximately 300 lb. per sq. in., all at seven days.

"A single consistency, corresponding to good average paving practice, was used throughout. Typical aggregates, a sand and gravel conforming in all respects to the requirements of the Michigan state highway specifications were employed; and all proportioning, mixing, molding, curing, and testing were strictly in accordance with the practice recommended by the American Society for Testing Materials.

"Three types of tests have been made—direct tension, flexure, and compression.

"The effect of variations in the quality of cement upon the strength of the concrete appears to be quite marked. Observing the relative values for each of the three grades at the end of the conventional curing period of 21 days, it was found that the strength of the concrete containing the high-test cement is approximately double that of the concrete containing low-test cement, and that the concrete in which the medium-strength cement was used runs about midway between. The significance of such wide variations in strength from the design standpoint will be readily apparent.

"If it be assumed that the edge thickness of a concrete pavement has been determined by the corner formula on the assumption that the concrete will have a modulus rupture of 600 lb. per sq. in. at the time the road is opened to traffic, it was found that, with the aggregates employed and for the conditions obtaining in these tests, the required modulus of rupture was attained in approximately 12 days by the use of the high-strength cement, in somewhat more than 28 days when the medium-strength cement was employed, and that it had not been reached up to six months when the low-strength cement was used. The low-strength cement did not pass the requirements for strength of the American Society for Testing Materials, but if, for this reason, we ignore the results of the tests on the concrete in which it was used, we still find the time required to produce concrete of the required quality to be markedly longer when the medium-strength (which passed as A.S.T.M. requirements) was used than when the high-strength cement was employed.

### *Relationship of Tests*

"It was observed that there is a very interesting relation between the results of briquette tests on the three cements at 7 and 28 days and the results of the various concrete tests at the same periods. There appears to be a very definite relation between briquette strength and concrete strength at corresponding ages. This relation, moreover, applies to all three types of concrete tests. It will not be asserted, of course, that these results are sufficient to warrant any conclusions of a general nature. It is believed, however, that the meagerness of the data presented is to a certain extent balanced by the remarkable concordance of the results obtained, so that they may be said to be at least indicative, therefore, of value in suggesting a field for additional and more extensive research."

# Agricultural Lime and Limestone for Onions*

## A Very Important Factor in Growing a Crop, Especially in New England

By Dr. J. P. Jones
Massachusetts Agricultural Experiment Station, Amherst, Mass.

IN the summer of 1926 set onions were found, in a great many instances, to be turning yellow at the tips, the leaves dying back and growth being stunted. In several cases there was little evidence of growth beyond that which is naturally sponsored by the set itself. So prevalent were these conditions that the county agent of Hampshire county, Roland Payne, in co-operation with the Massachusetts Agricultural Experiment Station, made a careful study of 114 onion fields, on which sets were growing, located in Hadley, North Hadley, Hatfield and Bradstreet. The fields were selected at random, soil samples taken and yield records obtained.

### *Many Onion Fields Very Acid*

Preliminary observations on soil acidity, using the "Soiltex Method," indicated that very frequently the poor growth of onions was associated with a very acid reaction of the soil. With this as a clue hydrogen ion determinations were made on each of the samples of soil by the more exact Wedge comparator method. Where so many random cases are concerned, if lime were the limiting factor the more acid soils would be expected to produce the poorest yield and vice versa.

An interesting point illustrated by the data in Table I is that 58 fields or about 50% of those examined were very acid. About half of the onion acreage for these districts is too acid to produce a maximum crop. It is true that even on this very acid soil, pH below 5.1, 13 fields gave a yield of 250 bags per acre or more. But there were 45 fields or about 68% with a similar degree of acidity where the yields were poor. On the very acid soil mostly poor onion yields were secured.

TABLE I. NUMBER OF FIELDS WITH YIELDS IN BAGS PER ACRE

| pH range | 250 or more | 200 to 250 | 150 to 200 | 150 or less | Total |
|---|---|---|---|---|---|
| 4.3 to 5.1 | 13 | 16 | 16 | 13 | 58 |
| 5.1 to 6.0 | 23 | 6 | 5 | 7 | 41 |
| 6.0 to 6.4 | 9 | 2 | 2 | 2 | 15 |

Only 41 fields or about 36% were found in the acid range of pH 5.0 to 6.0. In this less acid group of fields the yields were generally better, about 50% being 250 bags per acre and more. But even in this range of soil acidity there were far too many failures.

A very few fields were found showing the more nearly neutral reaction. There were 15 fields or about 13% with soils above pH 6.0 in reaction; 60% of these yields exceeded 250 bags per acre.

From this data the conclusion seems justified that the most of the poor yields of set onions are secured on very acid soil, while most of the good yields are obtained on soils not so acid. This evidence points very definitely to a lack of lime as being responsible for set onion failures in many instances. It should be noted that other circumstances such as previous crop effects and poor sets may be blamed in some cases.

### *Symptoms of Soil Acidity*

The best and most reliable guide as to the degree of soil acidity is the soil test. But the plant growth on that soil is the most dependable criterion as to the action of any particular degree of acidity. Set onions on very acid soil often start off well in the spring. Before they are very old golden yellow tips being to appear, in some fields earlier than others. As the season progresses the yellow tip extends back on the leaves with varying degrees of rapidity. In the extreme cases all of the older leaves soon become almost entirely yellow. Losing their rigidity, they gradually curl downward and die while the newer leaves, already yellow at the tips, are gradually following suit. In such case very little growth is secured beyond that sponsored by the original set. Variations from this extreme to cases where only a few leaves are completely lost, to where there is a slight yellowing of the tips and to fields where none of this discoloration appears are found. With such variations there is usually a corresponding variety in yield. The yellow tips are always suggestive of an acid soil and the soil test usually confirms it.

In seed onions the symptoms are not exactly the same. In the early part of the season it is the stunting of growth, the absence of a bushy and thrifty appearance, the presence of slight yellowing on the tips that indicates a lime deficiency. Later in the season there is more yellowing and dying back of the tips and also a sluggishness in the formation of bottoms. These symptoms vary according to the degree and activity of the acidity.

### *When to Lime*

Undoubtedly the best time to apply lime is in the autumn after the onions are harvested. It can be applied in the spring and even as a top-dressing. All that can be said at this time is that a top application can be given the onions when they are 8 to 12 in. high without injury.

Despite the fact that favorable results may be obtained from applications at other seasons, there are two chief reasons why lime should be applied in the autumn:

(1) There is a longer time for the lime to get thoroughly mixed in the soil and the chances of altering the acidity before it injures another crop are much greater.

(2) If an onion soil needs lime it is usually more convenient to apply it in the autumn than to run the risk of not having time to do it in the spring. Technically and from the farm management standpoint it seems good practice to apply lime in the autumn.

### *How Much Lime*

No definite rule as to how much lime to apply can be given. Each field is a subject for a separate decision. A reasonable decision can be made only after the soil has been carefully tested, and the nature of the onion growth known. The amount to apply may vary from none to four or five tons per acre. In cases where large amounts of lime are needed it should be divided into two treatments, one-half put on before plowing and the other half after plowing. The field should be thoroughly wheel harrowed immediately after each application.

Another point to be considered in liming any field is what crops are likely to be grown subsequently. If there is a chance of changing from onions to tobacco caution must be exercised against applying too much lime. Tobacco does not do well on thoroughly limed fields chiefly because of the black root rot which thrives under these conditions. Land that is limed sufficiently to grow good onions will seldom produce a full crop of tobacco until it has had time to become quite acid again.

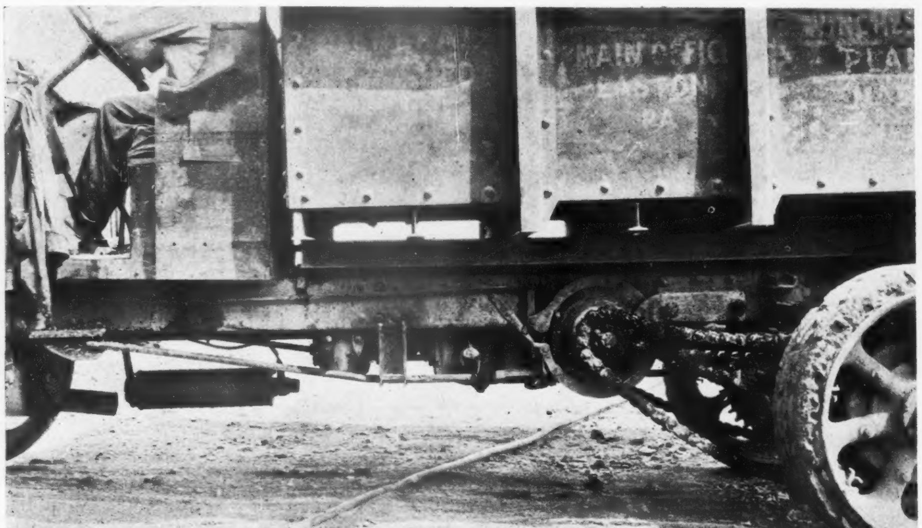
*Paper read at first annual New England Lime Conference, Amherst, Mass., July 13, 1927. (See ROCK PRODUCTS, August 6, 1927.)

# Hints and Helps for Superintendents

## Strengthening Quarry-Truck Chassis

THE Winchester (Mass.) quarry of the General Crushed Stone Co. was one of the first commercial crushed-stone quarries to be changed over from an industrial railway to motor-truck haulage. A description of this operation was published in ROCK PRODUCTS, September 18, 1926. The trucks used are 7½-ton Macks with special 12-ton steel bodies built by the Easton Car and Construction Co.

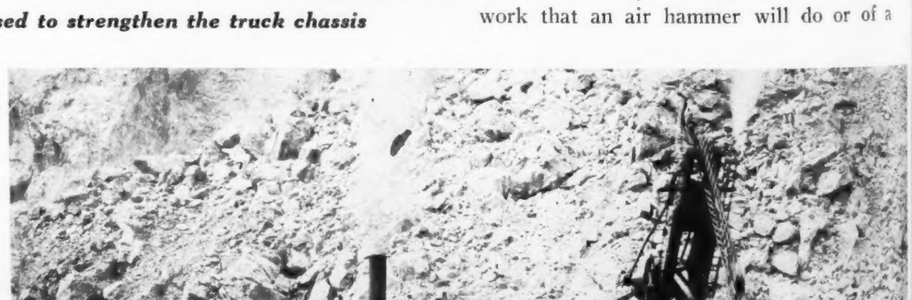
The service is naturally pretty severe, as the accompanying view shows. The shovels used for loading are converted 90-ton Marion railway type with 3-yd. buckets. The trucks frequently carry as much as 14 tons. Under a year or more of such service it was found that the truck chassis were not standing up and were showing signs of weakening.



*Showing the truss rods and struts used to strengthen the truck chassis*

Accordingly it was necessary to strengthen the chassis. This was done as illustrated in the second view by means of 1¾-in. truss rods. These are fastened near each end of the chassis frame to anchors electrically welded to the frame. Struts made of channel iron are also electrically welded to the chassis. Turn buckles near the centers of the rods make possible the necessary tension. The electrical welding was done by a local specialist. The cost was relatively slight, and apparently the life of the chassis has been prolonged indefinitely.

M. V. McKeon is superintendent of the Winchester plant and the man responsible for this "kink."




*Chassis strength is necessary to withstand the constant loading of 3 yd. of material*

## Uses for Old Rock Drills

By W. L. HOME

Consulting Engineer, Pine Plains, N. Y.

AROUND any quarry or underground property are a few old rock drills. Some are of the old type piston drills and others hammer drills. The old type piston drills mounted on a post in a blacksmith shop makes a mighty good air hammer and if the blacksmith is ingenious it can be made to save him a lot of work. Mount the drill on a post with the chuck end over an anvil. Upset a piece of drill steel until a good husky hammer has been made. Put this hammer in the chuck, connect up with the air line and the outfit is "rarin" to go.

Should it be necessary to use steam to run a rock drill and nothing but a hammer drill is available it is best to pick out the oldest most worn out drill you have, provided the parts are not broken and it does not leak badly. Hammer drills are designed to run by air and with very little clearance of the moving parts and no allowance for expansion caused by steam. It is for this reason

*John Rice, president, and M. V. McKeon, superintendent of Winchester quarry*

that the worn drill will prove to be the most efficient.

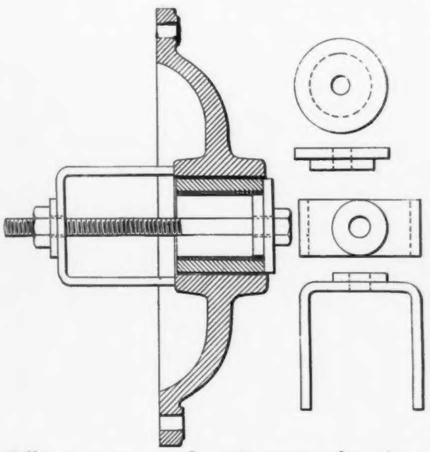
Hammer drills with the rotation device taken out are good for a great many uses, all depending on the tool you use instead of a drill. They will do almost any of the work that an air hammer will do or of a

paving breaker, such as breaking concrete or many other similar duties. Underground, with a moyle instead of a drill, the machine will cut hitches for timbers well and quickly. Outside, in the dimension stone quarry, it will split stone. In a slate quarry it will break up the big ones easier than a hammer. In fact how much it will be used will depend upon the imagination of the boss, but we know that such a machine with different shaped tools for it is a mighty handy article.

## Puller for Removing Motor Bearings

BEARINGS on electric motors, which may require replacement, are readily removed by a puller described by C. F. Beck in a recent issue of *Engineering and Mining Journal.* This device is especially applicable to motors located in remote places.

As the larger motor bearings are from



*Puller to remove electric motor bearings*

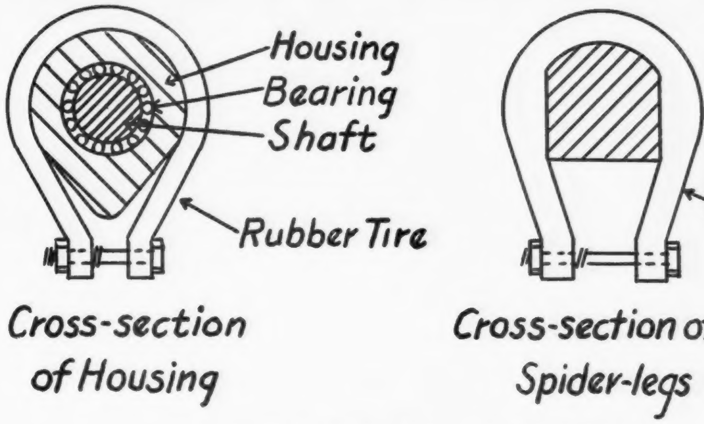
15- to 20-ton fit, and even tighter, it is necessary to take the end bells to the machine shop so as to press out the old bearings and press in the new ones. This consumes a great amount of time, which can be eliminated by using a puller similar to the one shown in accompanying sketch. It is only necessary to remove the end bells. By using another washer and removing the yoke the new bearings can be placed in position in a few minutes by using the same bolt.

## Novel Protector for Spider Legs of a Gyratory Crusher

By LOUIS CASSAYRE

AFTER 20 months of operation it was noticed that the three legs of the lower spider on the primary crusher had worn considerably from the continued dropping of rock upon them and if not checked would eventually be ruined. The housing supporting and covering the inboard bearing of the drive shaft had been worn to such an extent that the bearing had been exposed and worn through to the shaft.

A thin sheet of iron was welded over the worn housing, the bearing was replaced and




*Protection for spider legs of a gyratory crusher*

a rubber tire was stretched over the housing and bolted loosely at the bottom. The spider legs were treated the same way. After 11 months of operation the tires were replaced. The spider legs and housing were found to be as good as ever.

This repair job was done at the plant of the Bassett Rock Co., Napa, Calif.

## Handy Fishing Tool

BELOW is illustrated a fishing tool which is said to have proven quite effective in recovering drill bits lost in holes by pins breaking or becoming unscrewed. The description and diagram were supplied by W. J. Demody, machine shop foreman for the Corvell Portland Cement Co. to the *Armstrong Driller,* the house organ of the Armstrong Manufacturing Co., Waterloo, Iowa, from which this is taken.

When the drill bit is not stuck or cemented in the bottom of the hole, this tool should never fail to do its work, but in cases where heavy jarring is necessary to loosen the bit, a heavier and more expensive fishing tool should be used. It is especially useful in holes of 12-in. diameter.

## Hazards from the Plant Electrical Equipment

D. W. YAMBERT, electrical engineer, France Stone Co., speaking before delegates to the recent Quarry Safety Conference at Toledo, gave an interesting and instructive speech, during which the following "high spots" were noted:

1. Safety cut-off switches should be provided and when pulled for repairs should be locked out or have attached to them in a secure manner a sign forbidding anyone to tamper with the switch.

2. Wiring should be in conduit to avoid breaking of insulators or attaching additional wires for temporary purposes. These conduit systems should be grounded so that the ground wire is protected from breaks by force or by the building vibrating. Lightning ground wires should not be in conduit, as conduit will act as a choke coil negating lightning ground wire.

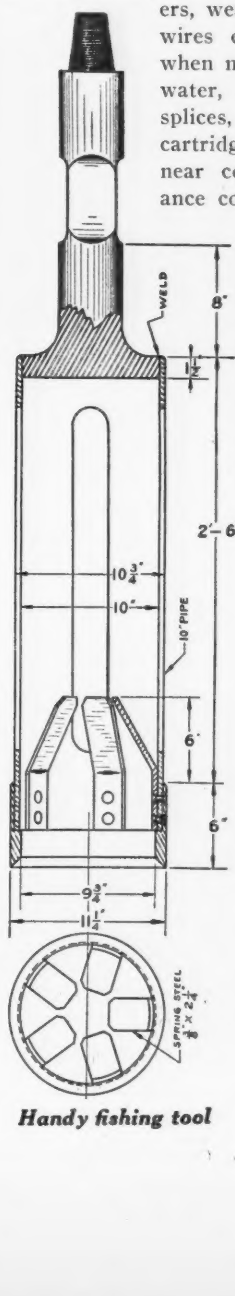
3. Protection from flash is effected by removing loads from circuit before pulling switches. Use of delayed contact switches and circuit breakers is advised. Circuit breakers for generators will avoid flash-overs.

4. All circuit breakers of open-air type should be placed at such an elevation as to avoid flashing in the faces of employes.

5. Fires are caused by crossed wires, unprotected with proper fuses or circuit breakers, weak or frayed wires, wires emerged in water when not insulated against water, poor joints or splices, badly filled fuse cartridges, electric heaters near combustiles, resistance coil wires with combustible insulation wires, or by the entering of lightning into the circuit through the lack of lightning arresters, choke coils and ground wires.

6. Another-hazard is caused by electrolysis eating up underground pipes where moisture comes in contact with them, existing current flow shorted to that moisture.

The France Stone Co., Mr. Yambert said, is fitting individual motors with interlocking switches that automatically take care of the flow of material through the mill in case of breakdown or repair work of any particular nature is to be made.




*Handy fishing tool*

# Financial News and Comment

## RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

| Stock | Date | Par | Price bid | Price asked | Dividend rate |
|---|---|---|---|---|---|
| Allentown Portland Cement Co. (common)[32] | May 24 | | 1½ | 3 | |
| Allentown Portland Cement Co. (6% bonds, 1932)[32] | May 24 | | 81 | 92 | |
| Alpha Portland Cement Co. (common)[2] new stock | Oct. 24 | No par | 34 | 36 | 75c quar. Oct. 15 |
| Alpha Portland Cement Co. (preferred)[2] | Oct. 24 | 100 | 115 | | 1¾% quar. June 15 |
| American Lime and Stone Co. (7% bonds, 1942)[32] | May 24 | | 39 | 39½ | |
| Arundel Corporation (sand and gravel—new stock) | Oct. 24 | No par | 45½ | 45½ | 50c Oct. 1 |
| Atlantic Gypsum Products Corp. (1st 6's carrying 10 sh. com.)[10] | Oct. 27 | | 110 | 121 | |
| Atlas Portland Cement Co. (common)[2] | Oct. 24 | No par | 40 | 43 | 50c qu. Sept. 1 |
| Atlas Portland Cement Co. (preferred) | | 100 | | | 2% quar. Oct. 1 |
| Atlas Portland Cement Co. (preferred)[2] | Oct. 24 | 33⅓ | 43 | | 2% quar. Oct. 1 |
| Beaver Portland Cement Co. (1st Mort. 7's)[8] | July 29 | 100 | 100 | 100 | |
| Bessemer Limestone and Cement Co. (Class A)[4] | Sept. 23 | | 36 | 36¼ | 75c quar. Oct. 31 |
| Bessemer Limestone and Cement Co. (6½% bonds)[4] | Sept. 23 | | 100 | 101 | |
| Boston Sand and Gravel Co. (common) | Oct. 21 | 100 | 73 | | 1% qu., 2% ex. Jan. 1 |
| Boston Sand and Gravel Co. (preferred) | Oct. 21 | | 85 | 90 | 1¾% quar. Jan. 1 |
| Boston Sand and Gravel Co. (1st preferred) | Oct. 21 | | 90 | 95 | 2% quar. Jan. 1 |
| Canada Cement Co., Ltd. (common) | Oct. 26 | 100 | 246 | 247½ | 1½% quar. Oct. 17 |
| Canada Cement Co., Ltd. (preferred)[11] | Oct. 21 | 100 | 123 | 124 | 1¾% quar. Aug. 16 |
| Canada Cement Co., Ltd. (1st 6's, 1929)[11] | Oct. 21 | | 101½ | 102½ | 3% semi-annual A&O |
| Canada Crushed Stone Corp., Ltd. (6½s, 1944)[11] | Oct. 21 | 100 | 96 | 99 | |
| Charles Warner Co. (lime, crushed stone, sand and gravel) | Oct. 21 | No par | 35 | | 50c Oct. 10 |
| Charles Warner Co. (preferred) | Oct. 21 | 100 | 108 | | 1¾% quar. Oct. 27 |
| Cleveland Stone Co. (new stock) | Oct. 26 | | 65 | 70 | |
| Connecticut Quarries Co. (1st Mortgage 7% bonds)[17] | Oct. 21 | 100 | 105 | | 50c qu. June 15 |
| Consolidated Cement Corp. (1st Mort., 6½s, series A)[24] | Oct. 27 | 100 | 97 | 99 | |
| Consolidated Cement Corp. (5 yr. 6½% gold notes)[24] | Oct. 27 | 100 | 94 | 97 | |
| Consumers Rock and Gravel Co. (1st Mort. 7s)[18] | Oct. 20 | 100 | 100 | 101½ | |
| Coosa Portland Cement Co. (6% bonds, 1944)[32] | May 24 | | 70 | | |
| Coplay Portland Cement Co. (6% bonds, 1941)[32] | May 24 | | 88 | | |
| Dewey Portland Cement Co. (1st mort. 6's 1942)[30] | Oct. 27 | 100 | 98½ | 100 | |
| Dolese and Shepard Co. (crushed stone)[7] | Oct. 27 | 50 | 100 | 103 | $1.50 July 1, $1 ex. July 1 |
| Egyptian Portland Cement Co. 7% pfd.[21] | Oct. 8 | | 85 | 90 | 1¾% quar. July 1 |
| Egyptian Portland Cement Co. (common)[21] | Oct. 8 | | 6 | 7½ | 40c quar. Oct. 1 |
| Fredonia Portland Cement Co. (6½% bonds, 1940)[32] | May 24 | | 97 | 101 | |
| Giant Portland Cement Co. (common)[2] | Oct. 24 | 50 | 45 | 55 | |
| Giant Portland Cement Co. (preferred)[25] | Oct. 24 | 50 | 40 | 45 | 3½% June 15 |
| Ideal Cement Co. (common) | Oct. 26 | No par | 95 | 97 | $1 quar. Oct. 1 |
| Ideal Cement Co. (preferred)[33] | Oct. 26 | 100 | 111 | 113 | 1¾% quar. Oct. 1 |
| International Cement Corporation (common) | Oct. 26 | No par | 55⅞ | 56 | $1 quar. Sept. 30 |
| International Cement Corporation (preferred)[2] | Oct. 26 | 100 | 108½ | 111 | 1¾% quar. Sept. 30 |
| Kelley Island Lime and Transport Co. | Oct. 26 | 100 | 180 | 183 | $2 quar., $2 ex. Oct. 1 |
| Lawrence Portland Cement Co.[2] | Oct. 24 | 100 | 98 | 101 | 2% quar. |
| Lehigh Portland Cement Co.[6] | Oct. 24 | 50 | 112 | 115 | 1½% quar. |
| Lehigh Portland Cement Co. (preferred) | Oct. 24 | | 73 | 78 | |
| Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1928 to 1931)[13] | Aug. 12 | 100 | 99½ | 100 | |
| Lyman Richey Sand and Gravel Co. (1st Mort. 6s, 1932 to 1935)[13] | Aug. 12 | 100 | 97½ | 99 | |
| Marblehead Lime Co. (1st Mort. 7's)[14] | Oct. 21 | 100 | 100 | | |
| Marblehead Lime Co. (5½% notes)[14] | Oct. 21 | 100 | 98 | | |
| Michigan Limestone and Chemical Co. (common)[6] | Oct. 24 | | | 26 | |
| Michigan Limestone and Chemical Co. (preferred)[6] | Oct. 24 | | 24 | 26 | 1¾% quar. July 15 |
| Missouri Portland Cement Co. | Oct. 26 | 25 | 38½ | 40 | 50c Aug. 1 |
| Monolith Portland Cement Co. (common)[9] | Oct. 20 | | 10½ | 11 | 8% ann. Jan. 2 |
| Monolith Portland Cement Co. (units)[9] | Oct. 20 | | 29½ | 31 | |
| Monolith Portland Cement Co. (preferred)[9] | Oct. 20 | | 9½ | 10 | |
| National Gypsum Co. (common)[35] | Oct. 27 | | 39 | 41 | |
| National Gypsum Co. (preferred)[35] | Oct. 27 | | 80 | 83 | |
| National Gypsum Co. (pref. carrying acc. div.)[35] | Sept. 15 | | 86 | 88 | |
| Nazareth Cement Co.[20] | Oct. 21 | No par | 32 | 34 | 75c quar. Apr. 1 |
| Newaygo Portland Cement Co.[1] | Sept. 23 | | 110 | 110 | |
| Newaygo Portland Cement Co. (6½% bonds, 1938)[32] | May 24 | | 100 | 102 | |
| New England Lime Co. (Series A. preferred)[14] | Oct. 21 | 100 | | 95 | |
| New England Lime Co. (Series B. preferred)[22] | Sept. 26 | 100 | 97 | 99 | |
| New England Lime Co. (V.T.C.)[22] | Sept. 26 | | 33 | 35 | |
| New England Lime Co. (6s, 1935)[14] | Oct. 21 | 100 | 100 | | |
| New York Trap Rock Corp. (6% bonds, 1946)[32] | Oct. 26 | | 100⅛ | 100½ | |
| North American Cement Corp. 6½s 1940 (with warrants) | Oct. 26 | 100 | 84 | 84 | |
| North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common)[32] | Oct. 21 | | 40 | 50 | 2 mo. period at rate of 7% |
| North American Cement Corp. (common)[19] | Apr. 9 | | 8⅛ | 9 | |
| North American Cement Corp. (preferred) | Apr. 25 | | | | 1.75 quar. Aug. 1 |
| North Shore Material Co. (1st Mort. 6's)[15] | Oct. 27 | 100 | 98½ | | |
| Pacific Portland Cement Co. (common, new stock) | Oct. 20 | | 25 | 26 | |
| Pacific Portland Cement Co., Consolidated[5] | Oct. 21 | 100 | 61¾ | | 25c mo. |
| Pacific Portland Cement Co., Consolidated (preferred) | Oct. 21 | | 81 | | |
| Pacific Portland Cement Co., Consolidated (secured serial gold notes)[5] | Oct. 20 | 100 | 98½ | | 3% semi-annual Oct. 15 |
| Peerless Portland Cement Co.[1] | Oct. 24 | 10 | 3¾ | 4¼ | |
| Pennsylvania-Dixie Cement Corp. (1st Mort. 6's)[29] | Oct. 26 | 100 | 98 | 98 | |
| Pennsylvania-Dixie Cement Corp. (preferred)[28] | Oct. 26 | 100 | 93 | 95 | 1¾% Sept. 15 |
| Pennsylvania-Dixie Cement Corp. (common)[28] | Oct. 26 | | 25 | 25 | 50c Oct. 1 |
| Petoskey Portland Cement Co.[1] | Oct. 24 | 10 | 11¼ | 12 | 1½% quar. |
| Pittsfield Lime and Stone Co.[31] | Oct. 8 | | | 100 | |
| Pittsfield Lime and Stone Co.[31] (common) | Oct. 8 | | | 25 | |

(CONTINUED ON PAGE 86)

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. Quotations by Bristol & Willett, New York. [3]Quotations by True, Webber & Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbitt, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hemphill, Noyes & Co., New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]William C. Simons, Inc., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]A. C. Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York.

# Editorial Comment

**Fear in Business**

In the course of a very pleasant trip to New York in company with the president of one of the largest organizations in the rock products industry, the conversation turned to the subject of philosophy, as it often does on such occasions, for all men of big business are interested in philosophy, whether they recognize it by that term or not. This man of large and successful business experience remarked that "no business is stronger than its organization—its personnel." Then reflecting on the building up of an organization, he remarked that sometime a philosopher would write a good and useful book on the subject of *fear.*

Young men coming into an organization, he said, have no fear. They are full of ambition and energy and enthusiasm. They instinctively look forward to bigger and better things. If they are of the right stuff they are not afraid of the minor responsibilities usually placed upon them. In fact, they seek new experiences, which is another way of saying, they invite responsibilities. But as they grow older in the organization they begin to *fear:* they are afraid they will not make good; they are afraid to assume responsibility, perhaps because they might step on someone else's toes; they are afraid the other fellow will receive more recognition than themselves; they are afraid they will lose their jobs; they are afraid the business itself is going to hell.

Now, if there is one thing the head of a great business organization looks for from his subordinates, it is enthusiasm and faith in him and in their business. His responsibility includes the constant presentation of a cheerful and optimistic viewpoint under much more trying conditions than any of his subordinates have to contend with. Keeping up the morale of the organization is usually considered a primary function of the chief executive, but it is one of those functions and responsibilities that can be generously shared with every single employe. Other responsibilities are not so easily unloaded.

Consequently, when employes get crabby and think they are abused because they are old, they should consider very carefully whether their condition is not directly traceable to this *fear,* that haunts them and undermines their business efficiency, very likely unconsciously, so far as they are concerned. Generally they will find that their lessening value to the organization is not because they are old—their length of service can be and should be a great asset, both of themselves and to the business—but because they have allowed fear to cramp their usefulness and petrify their resources. Is it any wonder then that executives are ever looking for "new blood"?

A young man is not afraid to make mistakes. He does not take himself so seriously that the fear of making a mistake over-rules his initiative. There is no good executive who will not pardon even a serious mistake if he knows it was the result of enthusiasm and enterprise. He does not expect the same mistake twice, to be sure; but he knows that even his own judgment is not infallible, and that no business ever progressed or prospered by failing to meet issues with action one way or another.

Again fear is a big factor in the success or failure of every business or industry. Producers cut prices because they are afraid they can not break into the business on the prevailing prices; they cut prices because they are afraid their competitors have made or will make cuts; they are in perpetual fear of what their competitors are doing or may do. Fear is the root of very much of the evil in many questionable trade practices and business policies.

Physiologists have proved that when fear possesses any animal—mankind included—it paralyzes other bodily and mental functions by actually injecting into the blood an essence or substance, the technical name of which we do not know. But the fact is proved that a man dominated by fear cannot mentally function efficiently or normally. Therefore, the philosopher who writes a book on how to meet and overcome this bugaboo—fear—that sometimes possesses employes and employers alike, will have contributed something worthwhile toward efficiency in business.

Perhaps the issue is being met in some organizations now by greater frankness between owners and employes, between managers and workers. Various devices have been set up in business to bring about an exchange of confidence between the two; but it is sometimes overlooked that to share the confidence of employes means more than taking them into some of the confidences of management; they, too, have confidences to exchange, which must be perceived and recognized before there can be mutual understanding. The management that is ready to explain and share its responsibilities with employes should be equally willing to listen to the problems and responsibilities of its employes.

Doubtless this present byproduct of accident prevention and employe welfare work will in time come to be recognized as its most important objective. Mental attitude, or perhaps fear, is a very important factor in safety work, as every safety engineer knows. A broader application of the same methods used in accident prevention may very possibly be the way in which this economic phase of fear may be approached, at least in so far as employes are concerned. The problem of overcoming fears of competitors may be more complicated.

## RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS (Continued)

| Stock | Date | Par | Price bid | Price asked | Dividend Rate |
|---|---|---|---|---|---|
| Riverside Portland Cement Co. | May 9 | .......... | 165 | .......... | 50c monthly, $1.50 ex. Aug. 1 |
| Rockland and Rockport Lime Corp. (1st preferred)[34] | Oct. 22 | 100 | 101 | .......... | 3½% semi-annual Aug. 1 |
| Rockland and Rockport Lime Corp. (2nd preferred)[34] | Oct. 22 | 100 | 57 | 65 | 3% semi-annual Aug. 1 |
| Rockland and Rockport Lime Corp. (common)[34] | Oct. 22 | No par | .......... | 45 | 1½% quar. Nov. 2 |
| Sandusky Cement Co. (common)[1] | Aug. 2 | 100 | 125 | 135 | $2 qu. Oct. 1 |
| Santa Cruz Portland Cement Co. (bonds)[8] | Oct. 20 | .......... | 105½ | .......... | 6% annual |
| Santa Cruz Portland Cement Co. (common)[8] | Oct. 20 | .......... | 81½ | .......... | $1 quar., $1 ex. Jan. 1 |
| Schumacher Wallboard Corp. (common) | Oct. 21 | .......... | 19⅛ | .......... | |
| Schumacher Wallboard Corp. (preferred) | Oct. 21 | .......... | 25 | 26 | |
| Southwestern Portland Cement Co. (units) | May 11 | .......... | 205 | .......... | |
| Superior Portland Cement, Inc. (Class A)[30] | Oct. 20 | .......... | 51¾ | 52½ | |
| Superior Portland Cement, Inc. (Class B)[30] | Oct. 20 | .......... | 37½ | 40 | |
| United Fuel and Supply Co. (sand and gravel) 1st Mort. 6s[27] | July 14 | 100 | 98 | 100 | |
| United Fuel and Supply Co. (sand and gravel) 6% gold notes[27] | July 14 | 100 | 98 | 100 | |
| United States Gypsum Co. (common) | Oct. 26 | 20 | 99½ | 100 | 40c quar. Sept. 30 |
| United States Gypsum Co. (preferred) | Oct. 26 | 123 | 123 | .......... | 1¾% quar. Sept. 30 |
| Universal Gypsum Co. (common)[3] | Oct. 27 | No par | 3 | 3½ | |
| Universal Gypsum V.T.C.[3] | Oct. 27 | No par | 2½ | 3 | |
| Universal Gypsum Co. (preferred)[3] | Aug. 31 | .......... | 40 | .......... | 1½% Feb. 15 |
| Universal Gypsum and Lime Co. (1st 6's, 1946)[8] | Oct. 27 | 100 | 100 | 96 | |
| Union Rock Co. (7% serial gold bonds)[18] | Oct. 7 | .......... | Called as of Nov. 1, 1927 | | |
| Upper Hudson Stone Co. (1st 6's, 1951)[32] | May 24 | .......... | 93 | .......... | |
| Upper Hudson Stone Co. (1st 6's, 1937)[32] | May 24 | .......... | 104 | .......... | |
| Vulcanite Portland Cement Co. (7½% bonds, 1943)[32] | May 24 | 100 | 98½ | 101 | |
| Whitehall Cement Mfg. Co. (common)[30] | Oct. 21 | .......... | 150 | .......... | |
| Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940)[15] | Oct. 13 | 100 | 99 | 101 | |
| Wolverine Portland Cement Co. | Oct. 26 | 10 | 6¼ | 6¼ | 15c quar. Aug. 15 |
| Yosemite Portland Cement Co. (Class B, common) | Oct. 21 | .......... | 4½ | 5 | |

## QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

| Stock | Date | Par | Price bid | Price asked | Dividend rate |
|---|---|---|---|---|---|
| Asbestos Corp. of Amer. (5 sh. pfd. and 5 sh. com.)[1] | June 22 | .......... | $1 for the lot | | |
| Atlanta Shope Brick and Tile Co.[1] | Nov. 24 | .......... | 25c | .......... | |
| Benedict Stone Corp. (cast-stone) (50 sh. pfd. and 390 sh. com.)[1] | Dec. 29 | .......... | $400 for the lot | .......... | |
| Blue Stone Quarry (60 shares)[2] | Mar. 16 | .......... | $10¼ for the lot | .......... | |
| Coplay Cement Mfg. Co. (common) (4) | Dec. 16 | .......... | 12½ | .......... | |
| Coplay Cement Mfg. Co. (preferred) (1) | Dec. 30 | .......... | 70 | .......... | |
| Eastern Brick Corp. (7% cu. pfd.) (1) | Dec. 9 | 10 | 40c | .......... | |
| Eastern Brick Corp. (sand lime brick) (common) (1) | Dec. 9 | 10 | 40c | .......... | |
| Edison Portland Cement Co. (common)[4] | Sept. 11 | 50 | 20c | .......... | |
| Edison Portland Cement Co. (preferred) | Nov. 3 | 50 | 17½c(x) | .......... | |
| International Portland Cement Co., Ltd. (preferred) | Mar. 1 | .......... | 30 | 45 | |
| Globe Phosphate Co. ($10,000 1st mtg. bonds, $169.80 per $1000 paid on prin.) | Dec. 22 | .......... | $50 for the lot | .......... | |
| Iroquois Sand and Gravel Co., Ltd. (2 sh. com. and 3 sh. pfd.) (1) | Mar. 17 | .......... | $12 for the lot | .......... | |
| Knickerbocker Lime Co.x | June 22 | .......... | 100 | .......... | |
| Limestone Products Corp. (150 sh. pfd., $50 par, and 150 sh. com., no par) | Dec. 22 | .......... | $60 for the lot | .......... | |
| Missouri Portland Cement Co. (serial bonds) | Dec. 31 | .......... | 104¾ | 104¾ | 3¼% semi-annual |
| Olympic Portland Cement Co. (g) | Oct. 13 | .......... | .......... | £1⅝ | |
| Phosphate Mining Co. (1) | Nov. 24 | .......... | 1 | .......... | |
| River Feldspar and Milling Co. (50 sh. com. and 50 sh. pfd.) (1) | June 23 | .......... | $200 for the lot | | |
| Rockport Granite Co. (1st 6's, 1934)[2] | Aug. 31 | .......... | 90 | .......... | |
| Simbroco Stone Co.[2] | Apr. 20 | .......... | 12 | 12 | |
| Southern Phosphate Corp.[6] | Sept. 15 | .......... | 1¼ | .......... | |
| Tidewater Portland Cement Co. (3000 sh. com.) | Dec. 22 | .......... | $6525 for the lot | .......... | |
| Vermont Milling Products Co. (slate granules) 22 sh. com. and 12 sh. pfd. (6) | Nov. 3 | .......... | $1 for the lot | .......... | |
| Wabash Portland Cement Co.[1] | Aug. 3 | 50 | 60 | 100 | |
| Winchester Brick Co. (preferred) (sand lime brick) (5) | Dec. 16 | .......... | 10c | .......... | |

(g) Neidecker and Co., Ltd., London, England. (1) Price obtained at auction by Adrian H. Muller & Sons, New York. (2) Price obtained at auction by R. L. Day and Co., Boston. (3) Price obtained at auction by Weilepp-Bruton and Co., Baltimore, Md. (4) Price obtained at auction by Barnes and Lofland, Philadelphia, Pa. (5) Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925. (6) Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass.

## International Cement Third Quarter Earnings

FOR the quarter to September 30 last the company reports net income of $1,234,973, equal to $1.90 a share on the 562,500 shares of common stock, after preferred dividends, and for the nine months the balance for the common was $3,282,519, or $4.94 a share. A year ago in the third quarter earnings available for common dividends were $1,379,583, equal to $2.15 a share, and for the nine months such net was $3,184,541, or $4.75 a share.

Below are given the comparative earnings for the first and third quarters of 1927 and 1926:

INTERNATIONAL CEMENT CORP. QUARTERLY EARNINGS

| Period ended September 30— | 1927—3 Months | —1926 | 1927—9 Months | —1926 |
|---|---|---|---|---|
| Gross sales | $8,291,490 | $8,023,344 | $22,133,617 | $19,728,513 |
| Less pkg. discount and allowance | 1,600,111 | 1,497,756 | 4,244,795 | 3,621,583 |
| Manufacturing costs, exclusive depreciation | 3,549,168 | 3,259,247 | 9,459,824 | 8,020,544 |
| Depreciation | 521,481 | 472,481 | 1,315,885 | 1,190,182 |
| Manufacturing profit | $2,620,730 | $2,793,860 | $ 7,113,114 | $ 6,896,203 |
| Shipping, selling and adm. expenses | 1,118,113 | 1,090,352 | 3,063,136 | 2,912,243 |
| Net profit | $1,502,617 | $1,703,508 | $ 4,049,979 | $ 3,983,960 |
| Federal taxes, contingency reserve, etc. | 267,644 | 323,926 | 766,460 | 799,420 |
| Net to surplus | $1,234,973 | $1,379,582 | $ 3,283,519 | $ 3,184,540 |
| Earnings per share on 562,500 shares, no par common outstanding | $1.89 | $2.14 | $4.94 | $4.75 |

## California Materials, Inc., Bonds Offered

M. H. LEWIS & CO., Los Angeles, Calif., are offering at 100 and interest $350,000 first mortgage 7% sinking fund gold bonds of the California Materials, Inc., Whittier, Calif., dated August 1, 1927: due August 1, 1939. Interest payable F. & A. at First National Trust and Savings Bank, Whittier, Calif., trustee, or Citizens National Bank, Los Angeles. Callable on any interest date at 103 and interest.

The following data are from a letter by A. H. Gregg, president of the company:

*Company.*—Has been organized for the purpose of acquiring all of the assets and business of Sycamore Canyon Gravel Co. of Whittier, Calif., which was organized in 1912 and incorporated in 1923. The rapidly increasing demand in the territory served has necessitated provisions being made for increased financing. Upon completion of present plans the company will constitute a complete unit in the industry with producing facilities of the most modern type obtainable insuring most favorable operating conditions at low cost.

*Security.*—A first mortgage upon all of the properties of the company now owned or hereafter acquired, including real estate, plant, equipment, etc., representing a total cost, less depreciation, of over $1,000,000. The principal property of the company consists of 100 acres of land located on the San Gabriel cone near the town of Baldwin Park, on which there will be immediately erected a thoroughly modern plant for the production of rock, sand and gravel having a daily capacity of 2500 tons. This plant will be of the latest type of einforced concrete and steel construction and will be equipped with the most modern and efficient machinery obtainable.

Additional properties of the company consist of 2½ acres of land in the city of Whittier improved with a modern fireproof warehouse and bunkers and approximately 13 acres located on Workman Mill road, Whittier.

*Earnings.*—Earnings of the predecessor company (Sycamore Canyon Gravel Co.),

according to a certified audit, have shown a satisfactory record, having averaged for the 5-year period ended December 31, 1926, approximately $40,000 per year. Current earnings according to the same audit, based upon operations covering the first six months of the current year, are at the rate of over $60,000 per annum.

Estimated earnings, giving effect to the operation of new facilities which will be provided through this financing, are estimated by the officers of the company at $150,000 annually, or over five times interest requirements on the bonds of this issue to be presently outstanding.

*Sinking Fund.*—Indenture provides for a minimum annual sinking fund of 1/10 of the largest amount of bonds outstanding commencing September 1, 1929, payable monthly to the trustee, or 5 cents per ton of materials sold from the new plant, whichever is greater. This sinking fund is to be used solely for the purchase of bonds in the open market up to 103, or call by lot at the redemption price if not obtainable in the open market. The minimum sinking fund is sufficient to retire the entire bonded debt by maturity.

*Purpose.*—Proceeds will be used to provide part of cost of construction of the new plant on the company's property at Baldwin Park, to retire a small existing mortgage on the property, and to reduce current liabilities.

*Management.*—The management of the company will be in the hands of men who have had long experience in the business.

The officers and directors are as follows: A. H. Gregg, president; John D. Gregg, general manager; A. Wardman, director (president Whittier Telephone Co.); L. A. Lewis, attorney, director; F. F. Pellissier, director (executive vice-president, Los Angeles Creamery Co., Los Angeles, Calif.); William A. Johnson, director (president Western Concrete Pipe Co., Los Angeles); J. L. Seppi, director.

All of the stockholders have waived their rights under the statute of limitations governing stockholders' liability in California so long as any of these bonds remain outstanding.

CONDENSED BALANCE SHEET, CALIFORNIA MATERIALS, INC.

**(As of July 22, 1927, Giving Effect to New Capitalization and Proposed Issuance and Disposition of $350,000,000 7% Gold Bonds)**

ASSETS

| | | |
|---|---|---|
| Current Assets: | | |
| Cash on hand and in banks | $ 17,466.58 | |
| Notes and accounts receivable less reserve | 78,110.18 | |
| Accounts receivable—affiliated company | 3,340.94 | |
| Inventories | 7,518.48 | |
| Subscriptions to capital stock | 700.00 | $ 107,136.18 |
| Investments: | | |
| Superior Sand and Gravel Co. | | $ 5,513.39 |
| Fixed Assets: | | |
| Gravel deposits and lands | | 1,011,236.09 |
| Plant property and equipment | $ 345,347.39 | |
| Less: Reserve for depreciation | 71,770.02 | |
| | | $ 273,577.37 |
| Leasehold on gravel lands | 5,000.00 | |
| Cash on hand set aside to provide part of the cost of new plant | 245,000.00 | 523,577.37 |
| | | $1,534,813.46 |
| Deferred items | | 36,595.78 |
| Total assets | | $1,684,058.81 |

LIABILITIES

| | | |
|---|---|---|
| Current Liabilities: | | |
| Contracts payable—August, 1927, installment | | $ 5,621.47 |
| Fixed Liabilities: | | |
| First mortgage 7% gold bonds (this issue) | $ 350,000.00 | |
| Contracts payable—deferred | 22,485.00 | |
| Total fixed liabilities | | $ 372,485.90 |
| Total liabilities | | $ 378,107.37 |
| Reserve for 1927 income taxes | | 4,085.49 |
| Total liabilities and reserves | | $ 382,192.86 |
| Capital and Surplus: | | |
| Capital stock issues | | 795,700.00 |
| Surplus arising from appreciation of gravel deposits and gravel lands based upon recent appraisals | | 506,165.95 |
| Total | | $1,684,058.81 |

## Waukesha Lime and Stone Co. Bonds Offered

KURCHLE AND CO., Milwaukee, are offering at 99½ and interest to yield 6.15%, $450,000 first mortgage 6% sinking fund gold bonds (closed issue) of the Waukesha Lime and Stone Co., Waukesha, Wis. Dated July 1, 1927; due July 1, 1937.

The following are data from a letter of H. M. Halverson, president of the company:

*Company.*—A Wisconsin corporation, organized in 1905, to operate quarries, sand and gravel deposits, and sell crushed stone, building stone, sand and gravel, agricultural limestone, mineral feeds, and many other quarry products incidental thereto. The tract of land on which the company's plants and buildings are located is approximately 279 acres and lies along the valley of the Little Fox river, on both sides of the river. Company has excellent railroad transportation facilities. Company has one of the largest and best gravel and stone deposits in the Northwest.

*Security.*—Secured by a direct closed first mortgage on all of the fixed assets of the company, specifically includes mineral deposits, reserve lands, machinery and equipment, comprising the company's plant located at Waukesha, Wis. These properties have been appraised by the American Appraisal Co. at a sound depreciated value of $708,798. These values do not include the millions of tons of deposit underlying and abutting the sand and gravel deposits which have been estimated to be sufficient to last over 100 years. Fixed values amount to approximately $1,575 for each $1,000 bonds of this issue exclusive of value of the sub-deposits. The balance sheet, after giving effect to this financing, will show net tangible assets equal to $1,850 for each $1,000 bond. Total current assets will show approximately $175,000, or more than three times total current liabilities.

*Sinking Fund.*—Indenture contains a sinking fund provision requiring the company to deposit each year a minimum amount of $20,000, or 25% of the net earnings of the company, whichever is the greater, for the purpose of retiring bonds of this issue. It is estimated the company will have retired more than 75% of the issue by maturity.

*Earnings.*—The average net income for the past six years, after depreciation available for interest, but before certain nonrecurring charges, amounted to $55,638, or more than twice the maximum interest charges on this issue. In addition to this, the company has expended during the past six years more than $170,000 for upkeep, and over $100,000 worth of new machinery and equipment has been added during the year 1926, as well as an expenditure of approximately $50,000 in new and additional equipment during the year 1927. Based on contracts already in hand, the company estimates the net earnings for the year 1927 will be approximately $125,000, which is at the rate of 4½ times the total maximum annual interest requirements on this issue.

*Purpose.*—Proceeds will be used in part to acquire and centralize control of corporate affairs in the hands of those who have materially contributed towards the successful operations of this company over a period of the last 15 years.

*Capitalization.*—

| | Authorized | Outstanding |
|---|---|---|
| First mortgage 6% sinking fund gold bonds | $450,000 | $450,000 |
| 7% preferred stock | 250,000 | 250,000 |
| Common stock (no par value) | 10,000 shs. | 10,000 shs. |

*Products.*—The company has one of the largest and best gravel and stone deposits in the Northwest, and in addition to its very extensive limestone deposits, it has underlying its gravel deposit an additional deposit of dense, fine-grained Niagara dolomite to an undeterminable depth. This limestone, according to surveys by the geological department for the state of Wisconsin, indicates that same is suitable for building and road material, agricultural limestone, mineral feeds, asphaltic paving dust, etc. This limestone underlies the entire property; the upper surface is from 20 to 30 ft. above the river bed and it has been estimated that the amount of limestone on the property is large enough so that mining at the present rate of production would last approximately 100 years.

Its sand and gravel deposits which lie above a certain proportion of its limestone deposits have a face of from 70 to 100 ft. in height. One of the major factors in determining the value of sand and gravel deposits in this section of the country is the ratio of gravel to sand. In the making of any concrete product the average proportions used are two parts of gravel to one of sand. This company's deposits, however, are in the proportion of three of gravel to one of sand, which proportion is determined by surveys made in making up the report of the American Appraisal Co. under date of December 31, 1926. According to an industrial survey made, most of the companies operating in this state have deposits of only one or less parts of gravel to one part of sand. The advantages, then, to Waukesha Lime and Stone Co. in this respect are obvious, as gravel is the needed product in concrete construction. Furthermore, due to the type of its deposit, it produces a highly fractural gravel which has superior binding qualities in concrete mixing. The production of sand and gravel this year will be approximately 400,000 tons, and this is being steadily increased, as side track facilities are being enlarged for the company's benefit by the Soo Line railroad. The company also produces from 125,000 to 150,000 tons of various crushed limestone products. It is estimated that the sand and gravel deposits amount to 40,000,000 cu. yd., or about 60,000,000 tons, which at the present rate of mining would last more than 100 years.

*Market.*—The territory served by the company includes Wisconsin and Illinois in its sand, gravel and crushed limestone, and extends into Indiana and Iowa with its lime-

stone products. Gravel, crushed stone and sand are the basic products, which, together with cement, are used in all concrete construction work such a paving and highways, public and commercial buildings, dwellings, sidewalks, etc. Gravel and crushed stone are also used in large quantities for ballast purposes by railroads.

WAUKESHA LIME AND STONE CO.
BALANCE SHEET
(As of December 31, 1926, and After Giving Effect to Present Financing)

ASSETS

| | | |
|---|---|---|
| Current Assets: | | |
| Cash in banks | | $ 73,519.56 |
| Readily realizable securities | | 45,172.86 |
| Customers' accounts receivable | | 22,367.81 |
| Inventory (at cost or market whichever is lower) | | 31,302.13 |
| Total current assets | | $172,362.36 |
| Fixed Assets: | | |
| Sound value of mineral deposits, land, buildings, machinery and equipment per report of the American Appraisal Co. as of December 31, 1926 | | $708,798.30 |
| Prepaid expenses and deferred charges | | 6,260.84 |
| | | $887,421.50 |

LIABILITIES AND NET WORTH

| | | |
|---|---|---|
| Current Liabilities: | | |
| Accounts payable | | $ 29,081.47 |
| Accrued taxes, insurance and wages | | 5,892.56 |
| Reserved for 1926 federal and state income taxes | | 10,109.46 |
| Customers' deposit on contract | | 5,000.00 |
| Total current liabilities | | $ 50,083.49 |
| First mortgage 6% sinking fund gold bonds | | 450,000.00 |
| Total liabilities | | $500,083.49 |
| Net Worth: | | |
| Preferred stock, 7% cumulative—Authorized and issued, 2500 shares @ $100 par | $250,000.00 | |
| Common stock, no par value—Authorized and issued, 10,000 shares | 137,338.01 | |
| | | $387,338.01 |
| | | $887,421.50 |

## Canada Cement Co. Sold to Wood, Gundy and Co.

AT the special meeting of shareholders of Canada Cement Co. held at Montreal recently, the offer submitted by Wood, Gundy and Co., Ltd., for the purchase of its assets was accepted. This acceptance will result in one of the largest financial transactions ever to have taken place in Canada with the single exception of Dominion of Canada bond issues. The result of the approval of the offer will be that each common shareholder will receive $250 per share, while each preferred shareholder will receive $125 per share. As there are $10,500,000 par value of preferred shares and $13,500,000 par value of common shares outstanding, the payments to shareholders will aggregate $46,875,000. The company has $4,543,146 first mortgage 6% bonds due in 1929 outstanding.

Attendance at the meeting was probably the largest in the history of the company and shareholders took occasion by sustained applause and actual cheering to express their warm regard for Frank P. Jones, the president, and their appreciation of the excellent manner in which he guided the company during the past 18 years.

R. O. Sweezey, in speaking on the fine achievements of Mr. Jones as regards the shareholders, the employes of the company and the public in general, remarked that during the past 18 years Mr. Jones was able to create an equity of over $33,000,000 besides the many millions of dollars paid out in dividends.

The bankers will take over the company's nine plants in Canada with a capacity of 12,000,000 bbl. a year and gypsum deposits in northern Nova Scotia and Cape Breton Island as well as the controlling interest in the Pennsylvania Gypsum Co. at Chester, Penn. The latter interest was acquired in January, 1926.

The stockholders of Canada Cement Co. will have to deposit their stock with the Montreal Trust Co. before November 21 to avail themselves of the purchase offer.

Mr. Jones, the retiring president, attributed much of the success of the company to the co-operation of the directors and the loyal service of the employes. The latter, he said, also benefited from the prosperity of the company. Shares were sold to them on a preferential basis from time to time, which at the purchase price of the company have a value of $3,500,000. Furthermore, he added, another block of shares has been turned over to trustees for the future benefit of employes, which means another $3,500,000.

The business for which this payment is to be paid is in the front rank of Canadian industrial institutions, and its progress has probably been unsurpassed by any other important Canadian industrial enterprise. Established in 1909 as a combination of 12 Canadian cement manufacturers, the business has displayed a gradual but consistent improvement in its financial position. Even during war years and the period immediately following, there have been few annual reports that have failed to indicate a substantial addition to the profit and loss surplus after payment of preferred and common dividends.

One interesting point in connection with the company's development is that the capitalization today is practically identical with that revealed by the first balance sheet published on December 31, 1909. Preferred and common share capital has remained unchanged, while the amount of then outstanding bonds has been reduced. This interesting performance, in the face of the severe tests to which Canadian industries were placed during the war, is almost unique. The history of the company affords one of the best illustrations of the results that may be accomplished over a period of years through careful management and maintaining the good will of the public at large. (See Rock Products, April 2, 1927, for complete history.)

Refinancing plans are under way and a syndicate of bankers headed by Wood, Gundy and Co. are now offering a new issue of $20,000,000, 5½% first mortgage bonds. A. C. Tagge, vice-president and assistant general manager of the old Canada Cement Co., has been elected president of the new company. An announcement states that the directors of the old company are to be included in the new company's board, to which will be added Sir Herbert S. Hold, J. B. Gundy and J. D. Johnson. F. P. Jones, retiring president, will also be on the board. J. D. Johnson, who has been added to the board of directors, will be vice-president and general manager.

## Lehigh Portland Plans New Issue of $30,000,000 Preferred

A SPECIAL meeting of stockholders of the Lehigh Portland Cement Co. has been called for December 16 to vote on a proposed increase of capital stock from $30,000,000 to $60,000,000. The authorized common share capitalization of $30,000,000 of $50 par stock will not be changed, but a new issue of 7% cumulative preferred stock consisting of 300,000 shares of $100 par value stock will be authorized.

If the plan proposed by the directors is adopted, the authorized capital stock will thus be evenly divided between common and preferred stocks. There is now $22,517,400 outstanding common stock. The capitalization was increased from $25,000,000 to $30,000,000 on January 16, 1924.

## Kelley Island Plans Common Stock Split Up On 4 to 1 Basis

STOCKHOLDERS of the Kelley Island Lime and Transport Co. have been asked to vote on changing the authorized common stock from 80,000 shares par $100 (77,238 shares outstanding), to 400,000 shares of no par value, four new shares to be issued in exchange for each common share held. It is expected that dividends at the rate of $2.50 per annum will be inaugurated on the new stock. This is equivalent to $10 per annum on the old common stock, which rate has been paid during the current year as well as the previous year.

## North American Cement Earnings

NORTH AMERICAN CEMENT CORP., Albany, N. Y., reports net earnings for August of $167,490 after depreciation and depletion but before interest and federal taxes. For the eight months ended August 31, income before interest and federal taxes was $521,000.

Below are given the earnings for the period ended August 31, 1927:

NORTH AMERICAN CEMENT CORP.—EARNINGS

| | Month | 8 Months |
|---|---|---|
| Period ended August 31, 1927— | | |
| Net earnings after depreciation, and depletion, but before interest and federal taxes | $167,490 | $521,000 |

# International Congress for Testing Materials

## Abstracts from the Proceedings of the Meeting Held in Amsterdam, Holland, September 12 to 17, 1927

By Dr. Curt Platzmann

FOR the first time since the war Germany was a participant at the International Congress for Testing Materials, in Amsterdam, from whose proceedings brief abstracts of reports submitted at the congress, which might be of particular interest to ROCK PRODUCTS readers, are given below.

### *Reinforced Concrete*

PROF. DR.-ING. E. PROBST, Technische Hochschule, Karlsruhe, touched on the problems of reinforced concrete. He stated that, although great progress has been achieved in the field of reinforced concrete during the past decades, a number of problems are awaiting solution. Thus the tensile strength of concrete is neglected in reinforced concrete construction without sufficient reason. The compressive strength is seldom utilized completely, while lower tensile strength reduces safety against crack formation. The problem of shrinkage of concrete and reinforced concrete structures is only partially solved to date, that of watertightness has resolved itself into improvements by natural means. Rational proportioning and working of the concrete, as well as correct distribution and laying of the reinforcement, form the basis of securing watertight concrete and reinforced concrete construction. Admixtures and coatings alone present no advantages for permanent construction. A problem whose investigation is of utmost importance is that of the behavior of concrete and reinforced concrete under repeated load. The fatigue phenomena, observed in this connection, have been the object of study for a number of years in a series of tests continued to the present time.

F. EMPERGER, director, Techn. E. H., Vienna, reported on "High Test Steel for Compression Members (Columns and Arches) of Reinforced Concrete."

R. MAILLART, engineer, Geneva, discussed the compressive stress in flexure, presenting test results and slides showing the rupture of specimens during flexure in a test series carried out in 1906 and used as material in drawing up the Swiss specifications in 1909. The test beams were made of pumice concrete and had a cube strength of 80 kg. per sq. cm. They furnish an illustration of the safety of low-grade concrete stressed in flexure.

His conclusions were: With the customary percentage of reinforcement of 0.75% to 1.0%, steel remains the primary cause of failure even when a low-grade concrete is used. High concrete strength, therefore, does not increase the safety of ordinary construction—assuming that the latter is carried out perfectly—and special methods to produce higher strengths are an unnecessary encumbrance in this case, not justified by corresponding advantages. Devices for control of grading, continuous tests of concrete, etc., are justified only on special construction, where higher concrete stresses are allowed for reasons such as reducing the dead weight or insufficient clearance. It should be required in all cases that the contractor have sufficient practical experience to judge the properties of materials, the quantity of mixing water and the extent of hardening of concrete.

### *Selection of Concrete Proportions*

R. W. CRUM, Iowa, U.S.A., reported on the selection of concrete proportions with special reference to the water-cement ratio and the void determination method. He traced the history of both methods and discussed the principles on which they are based and pointed out the importance of the relation between strength and water-cement ratios. He then described the practical application of the water-cement ratio theory on the job referring to the apparatus required for this purpose and to the advantages which are to be derived for the contractor from an improvement of the quality concrete.

G. WOLTERBEEK, engineer, Zutphen, reviewed tests of reinforced concrete structures caried out in the Dutch Indies. It was observed that such structures in the vicinity of the sea showed corrosion of the reinforcement and consequent spalling off of the concrete. Concrete located under water showed no deterioration phenomena. The danger zone lies immediately above the high-water level, where the concrete is exposed to alternate drying and wetting by the waves. During each wetting the voids of the concrete become filled with salt water, which, upon evaporation, leaves a saline residue. This process has been found to result in samples with 6% salt. The concrete should be protected by waterproofing of the surface and special care should be given to the protection of the reinforcement.

### *Concrete in Sea Water*

DR. R. GRUN, director of the Research Institute of the Steel Industry, Dusseldorf, selected cement in sea water for his subject. Upon reviewing briefly the development of cements with respect to their resistance to the effect of sea water, he cited several cases of failure of concrete exposed to sea water and discussed the methods used thus far to impart watertightness to concrete. This was followed by numerous examples of failure of concrete due to other aggressive solutions and prevention methods used successfully or unsuccessfully.

Finally, the action of agressive solutions—classified as sulphates and other salts, acids and organic substances, such as oils—was briefly touched upon.

Recent investigations have shown that the following measures are suitable for the preservation of concrete in sea water.

1. Dense structure in accordance with Fuller's curve.
2. Cements without free lime.
3. Protection by impregnation or coatings.

These measures were discussed individually. A method was suggested for testing the quality of protective coatings, which are continuously gaining in importance. Tentative specifications for a test of resistance to sea water were presented to collect material.

DR. G. HAEGERMANN, director of the laboratory of the Association of German Portland Cement Manufacturers, Berlin, reviewed the test methods for portland cement prescribed by the different specifications, and discussed the more important test methods for the determination of the time of set, soundness and other properties of cement.

### *Strength of Concrete and Mortars*

PROF. ING. F. KLOKNER, Böhmische Technische Hochschule, Prague, reported on the increase of strength of concrete and mortar with age. The following formulas have been established for this relation of compressive strength:

Bach's formula:

$$K = K_1 \times \left( -1 - \sqrt[6]{\frac{1}{0.3\,d + 1}} \right)$$

American formula:

$$K_{28} - K_7 + 7.95\, K_7$$

E. M. P. A. formula:

$$K - K_{28} \cdot \frac{a \cdot d\, 2/3}{b + d\, 2/3}$$

where $K$ is the concrete strength at a certain age;

$K_7$ the 7-day strength;

$K_{28}$ the 28-day strength;

$K_1$, $a$, $b$ are constants dependent on the properties of concrete aggregates, on the quantity of mixing water, method of working, curing and similar conditions; and

$d$ is the age in days.

A new and relatively simple formula was established on the basis of tests carried out in this connection at the Testing Laboratory of the Bohemian Technische Hochschule in Prague:

$$K = A + B \log d,$$

where $A$ and $B$ are constants and $d$ the number of days.

The formula is quite general.

Numerous tests have proven that this formula is applicable not only to the compressive strength, but also to the tensile strength, bending strength and bond strength between concrete and steel. Check tests of Bach's results showed a very good agreement.

The advantage of this new formula is its simplicity. It is a straight line relation, involving but two constants, which can be established by two tests of the same concrete at different ages.

For plastic concrete, containing 300 kg. cement per cu. m. mixed aggregate of average quality, these constants for compressive strength are as follows:

$$A = 70,\ B = 140.$$

### *Standard Tests of Portland Cement*

Prof. Dr. M. Ros, Zürich, summarized the present status of standard tests of portland cements. From the point of view of uniform laboratory test methods, the more natural prism specimens of plastic mortar appear to be equally well suited as the dry-tamped mortar specimens. From the practical standpoint, there is a distinct advantage in using the former. The average discrepancies are the same for both methods.

The value of a test for the construction job lies in the justification of applying the standard values obtained in the laboratory to the job conditions, of transferring the strengths obtained on standard specimens in compression and flexure to the strength and elasticity relations of job concrete with an accuracy sufficient for the purpose.

Tests of specimens of plastic consistency conform to the practice on present-day concrete and reinfored concrete pobs. The ratio of the cube strength of mortar specimens of plastic consistency to that of dry-tamped specimens is about 0.60. The ratio of the flexural strength of prisms of plastic consistency to their cube strength is about 1:6.

### *Alumina Cements*

H. Le Chatelier and A. Duhameaux, Paris, reported on their tests of alumina cement. The compounds occurring in alumina cement were studied. The existence of three calcium-aluminates with varying hydraulic properties were established:

$CaO{\cdot}Al_2O_3$, $5CaO{\cdot}3Al_2O_3$, $3CaO{\cdot}Al_2O_3$.

The occurrence of the two following silicates is possible:

$2CaO{\cdot}SiO_2$, $2CaO{\cdot}Al_2O_3{\cdot}SiO_2$.

Hydration is practically completed after 11 hours. With 10% silica, 45% alumina and 45% lime the following composition may result:

$$2(2CaO{\cdot}SiO_2) + 5(CaO{\cdot}Al_2O_3)$$

or

$$2(2CaO{\cdot}Al_2O_3{\cdot}SiO_2) + 5CaO{\cdot}3Al_2O_3.$$

Prof. Paul Joye discussed the heat phenomena during setting of cement.

Prof. E. Davis spoke of the volume changes in portland cement mortar and concrete due to causes other than temperature changes. A special study was made of the volume changes produced by varying moisture conditions. The apparatus used was described as well as the procedure for keeping temperature and moisture conditions constant. The effect of the water-cement ratio, grading of aggregates and their properties on expansion and contraction was explained.

### *Bettering of Portland Cements*

Prof. Dr. Ing. Gehler, of the testing laboratory, Technische Hochschule, Dresden, made reference to strength tests of cements (including soundness, time of set, shrinkage). He pointed out the rise of strength of commercial cements since 1913 (portland cement, iron portland cement, slag cement), the appearance of German high test cements, whose present compressive strength at 3 days is 350 kg. per sq. cm. and at 28 days 625 kg. per sq. cm.; tensile strength at 3 days 30 kg. per sq. cm. and at 28 days 46 kg. per sq. cm., and the progress in cement manufacture and in the machine industry. He then referred to the German alumina cement (Alca cement) and its resistance to sulphates, to official specifications and job experience, and to the future development of scientific statistics for testing materials in accordance with the correlation theory.

Raising the tensile strength was designated as the next task. In 1913 the ratio of tensile to compressive strength of commercial cement was 1:10; today this ratio for a high test portland cement is only 1:13.6, which is of utmost importance where cracking of reinforced concrete beams is the result.

This was followed by a discussion of the problem, whether the compressive strength is best tested on cubes or columns. (Recent tests carried out in Dresden were quoted.)

The recent concentrated development and the outlook in the future urge international co-operation and standardization of notation and tests of cement.

### *Weathering of Rocks*

Prof. Dr. Steuer, Technische Hochschule, Darmstadt, spoke on the weathering of rock. Reports of investigations of resistance to weathering of rock have been scarce for the last 12 years for well-known reasons. A basic treatment in the light of original investigations was published by Hirschwald in 1912. In spite of considerable progress, many tests have not been satisfactory, which is the case of rock preservation measures. In recent years a desire for short cuts in methods of investigation has become manifest. Aside from technical experiments, petrographic examinations should be developed further. Climatic observations, as well as observations of the composition of the air, precipitated water and ground water in the vicinity of structures, have been neglected. Mechanical weathering and its relation to certain mineralogical-chemical processes is of special interest for road construction where basalt is used, as it is affected by the sun. Grey spots are not a sufficient indication; an investigation with the aid of acids and alkali-carbonates may give indicative results, but treatment with boiling distilled water is a reliable method. The speaker urged additional instruction for engineers and architects in sciences pertaining to rock.

Prof. Burchartz, State Testing Department, Berlin-Dahlem, reported on compression tests of brick.

Prof. Chr. K. Visser, Technische Hochschule, Delft, dealt with the effect of firing methods on unit weight and specific gravity of brick. It can be determined by heating to increasing temperatures small samples molded from a certain lot of clay. The specific gravity generally increases gradually up to 1000 deg. C. The drop which follows is more rapid. The maximum and minimum values are relatively close to each other.

### *Testing Road Materials*

R. Schlyter, Stockholm, described the method of testing road material giving a review of existing methods approved by the Swedish State Testing Department. He then quoted strength test results of different native rocks such as granite, gneiss, diabase, sandstone and limestone. The results were plotted in diagrams and given in tables simultaneously with similar values obtained in other countries.

Prof. Burchartz, State Materials Testing Department, Berlin-Dahlem, chose road material as his second topic. The report dealt with tests of road material proper, i.e., of natural or artificial rock used in the form of paving units or aggregate.

Attention was drawn to the stresses produced in road material under conditions of service (natural and traffic agencies), to the requirements which should be placed on such materials and to the properties which should be determined as an indication of the quality and suitability of these materials in the laboratory. The following properties are important:

1. Resistance to weathering.
2. Compressive strength.

3. Wear.
4. Resistance to impact (toughness).
5. Resistance (to crumbling).

The resistance to weathering is determined by petrographic investigations, absorption, saturation coefficient and freezing tests.

A critical review of the existing test methods of the above properties was made. Finally, the properties determining the suitability of rock as paving units or aggregate were discussed.

Dr. H. Salmang, Technische Hochschule, Aachen, submitted a report of tests of refractories.

Prof. Dr. C. J. Van Nieuwenburg, Technische Hochschule, Delft, sketched the progress of manufacture of refractories.

M. C. Booze of Ohio told of recent progress in testing refractory materials.

### *Cellular Concrete*

Ing. Erik v. Meijer, Copenhagen, reviewed the composition and properties of cellular concrete, which is a light weight concrete obtained by mixing a viscous foam with cement, sand and water. The large number of gas bubbles in the foam is retained and is evenly distributed in the cellular concrete which sets and hardens like ordinary concrete. It is characterized by very light wight of 300—1200 kg. per cu.m. as against 2200 kg. per cu.m. for ordinary concrete. It also has lower heat conduction of 0.049—0.30 as against 1.2 for ordinary concrete. Its strength is lower than that of the latter. However, it is resistant to water, frost and fire. It actually absorbs no water, affords protection from corrosion and is particularly soundproof. A similar product is also manufactued from gypsum.

### *Silicate Research*

Prof. B. Schwezow, Moscow, outlined the great progress achieved in the field of research and manufacture of siliceous structural materials within the last decade. Portland cement has been greatly improved by puzzolanic admixtures. The problem of standardizing sand is practically solved. Standards for cements of every description have been worked out. Extensive studies were devoted to ceramic materials, .the microstructure of brick having tremendous bearing on practical problems.

Long time tests have resulted in manufacturing valuable cements from natural anhydrite and dead burned gypsum.

The treatment of clays with acids has led to the manufacture of "keramolith" and "keramofaserit," the latter containing asbestos—materials which resist the action of water.

### *Masonry in Old-Time Buildings*

Dr. Ingr. A. L.W.E. van der Veen, Den Haag, described the original rock used in old time buildings in the Netherlands, their origin and properties. The old quarries were geologically established for every historic monument. These conclusions were later corroborated by old signs and markings. The natural rock used in these buildings came from Vecht-Rhine-Maas-Schelde. The State Institution at Holland for the preservation of historic monuments makes use only of resistant rock, which has stood up under similar circumstances.

Dr. van der Veen stated:

Shale—limestone—tufa—sandstone—basalt have a resistance to weathering in the order in which they are named and lead has withstood the centuries more successfully than shale.

The resistance to frost action of a given material is proportional to its tensile strength and to its permeability. When saturated with water all rock disintegrates, so that each unit must be joined in a way preventing all possibility of saturation. Soluble constituents in a rock travel to the surface, leaving voids. Therefore, natural rock should not be placed with its strata parallel to the evaporation surface. All limestones are exposed to dolomitization in marine climates. Firebrick has given good results.

In ancient times lime was underburned and mixed with sand to a lean mortar. Only in exceptional cases has mortar been the cause of disintegration of the masonry. Cement, as manufactured 50 years ago, had a strong detrimental effect on the stone. Steel should be avoided in masonry.

### *Aggregate Grading*

Dr. Ing. W. Petry, Oberkassel, spoke of the recent researches in Germany to establish the correct structure and grading of concrete aggregates for the purpose of producing the densest and strongest concrete. He enumerated the German rock resources, including crushed rock and gravel, touching on their composition and the differences between ideal and natural aggregate. He tried to point out how closely the ideal grading curve can be approximated in practice, referring in this connection to the specifications for job control worked out by the German Conrete Institute (Beton Verein).

Prof. H. Rebozee, Brussels, reported on shrinkage, contraction and expansion of concrete. These are based on chemical reactions, which are sometimes produced during setting and hardening of cements due to extraneous influences, on temperature and moisture changes.

G. Magnel, Ghent, contributed a report on the study of concrete. He established that calcium chloride considerably reduced the final strength and rate of hardening of slag concrete, contrary to results obtained with portland cement. He stressed the advantage of standardizing tests of concrete to permit a comparison of tests carried out by different parties.

Ing. M. Leclerc du Sablon, Toulouse, made a report of tests for the most favorable composition of mortar and concrete. He treated the effect of density of concrete on strength, the grading of sand and coarse aggregate and the quantity of mixing water.

### *New Testing Methods Proposed*

Prof. Dr. Ing. O. Kallauner, Brünn, advanced the following suggestions:

1. Tentative method for a uniform determination of the detrimental effect of lime lumps in brick—Five samples of brick are placed over boiling water for four hours and if no spalling results, the lime lumps are considered harmless.

2. Tentative method of testing the permeability of roofing brick—Six brick are placed in two rows of three bricks each on three lattices in the shape of a roof and are exposed to artificial rain for 34 hours.

3. Tentative specification for a uniform designation of the absorption of ceramic wares by volumetric values only—It is recommended that absorption be based entirely on volumes.

4. Tentative method for the determination of soluble solids in ceramic earths—The determination is made on a filtrate, absorbed by means of the Berkenfeld apparatus from a suspension of 25 gm. earth in about 300 cc. distilled water.

5. Tentative method for the uniform determination of soluble solids in ceramic products—The determination is similar to the above with variations called forth by the character of the material investigated.

6. Tentative method of testing the resistance to acids of ceramic products—One gram of dried aggregate (fineness between 900 and 1600-mesh sieves) is heated with 25 cc. concentrated sulphuric acid and subsequently with 50 cc. of 5% soda solution. The residue retained on an ash filter is weighed.

Director M. R. Dutron, Brussels, made investigations of rational proportioning of mortar and concrete. His investigations were made for the purpose of determining the requirements which should be satisfied by mortar and concrete with regard to density, strength and ease of transportation. To satisfy these the quality of cement, the grading of aggregates and the quantity of mixing water are the determining factors.

## Sampling Atmospheric Dust

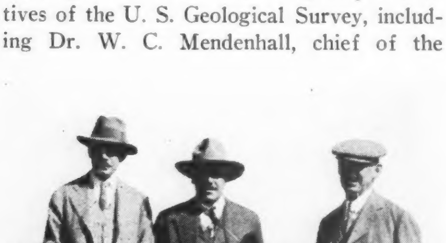
The Bureau of Mines has recently issued circular No. 6408 describing the apparatus as developed in its laboratories for sampling atmospheric dusts by the impinger method. This apparatus comprises a collapsible stand carrying a portable, hand-operation suction pump connected to the impinging device inserted in a sample bottle. Some data on the preparation, calibration curves, selection of sample bottles, collection of samples, recording methods and some notes on the solubilities of certain dusts in water or other solvents are included in the circular. A brief outline of laboratory methods for counting the particles and separating the sizes by which an estimate of the amount of dust in the air at the time and place of sampling is also given.

# Value of Geology to the Producer Shown at State Geologists Meeting

WHEN the Association of State Geologists met at Urbana, Ill., on October 20, Rock Products was represented at the gathering because of a firm conviction that mucn of value to the producers of sand, gravel and stone could be learned from this group. This conviction was entirely sustained by the meeting at Urbana, together with the three-day field trip over much of the northern portion of Illinois, which followed the opening session.

The association is actually composed only of state geologists from each state, but the meeting was well attended by representatives of the U. S. Geological Survey, including Dr. W. C. Mendenhall, chief of the survey, and Dr. David White, senior geologist, and by professors of geology and others interested in this work, as well. The Illinois State Geological Survey, whose offices are at Urbana, acted as host, and Dr. M. M. Leighton, chief of the Illinois Survey, arranged the program and was in charge of the field trip. Dean Kay of the University of Iowa and the Iowa Geological Survey, was chairman of the meeting. The transportation for the three-day trip was furnished with the compliments of the Public Service Co. of Northern Illinois and the Illinois Power and Light Corp., each supplying one large motor bus.

***Busses used to transport the party***

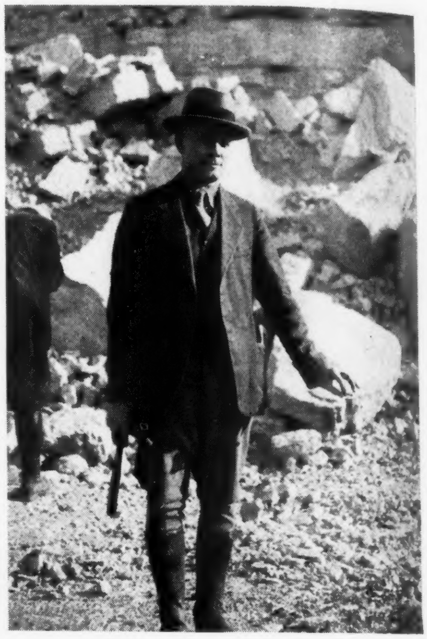


***Left to right—A. C. Noe of the Illinois and Iowa Surveys, Dr. Mushketov, and David White***

### *Opening Meeting*

The first sessions of the meeting were held jointly with the National Academy of Sciences, which was also in session at Urbana at that time. Shortly after the close of these sessions the party left for Bloomington, Ill., to commence the strenuous work of the meeting. It would be useless to detail the program of the trip that followed, but is is certainly worth while to touch on the main points seen and discussed.

An interesting case showing how the aid of a geologist could have saved the producer considerable money was brought out at one point in the trip. The stop was made at the Western Sand and Gravel Co. pit near La Salle, Ill. The superintendent of the plant told the party that the gravel in the pit was so cemented together by silt that it could not possibly be washed clean, and so, of course, could not be used for concrete work. Had one of the Illinois state geologists been consulted before the pit was opened he could have given a very accurate estimate of just what type of gravel could be obtained from the pit, knowing the topography and geological history of the surrounding country. In this case, at least, the result was not disastrous, since the gravel which could not be used for concrete was found to be very satisfactory for making gravel roads, as the enclosed silt acted as an effective binder. In other cases, however, reported by geologists from widely separated parts of the United States, the results were not so well. Gravel pits which had been opened by the producers without consulting the state survey were found to contain too much clay, just as the pit mentioned above did, and they eventually were forced to cease operation after spending considerable money.



***Dr. M. M. Leighton***

### *Service of the Geological Surveys*

Perhaps an even more important service which the geologist can perform than showing the producer where not to locate, is showing him where he should locate. For example, it is known that at one time there was a lake in northern Illinois perhaps 50 miles long. Geologists call attention to the fact that at certain points deltas were built out into this lake, and that these deposits still remain and are available supplies of gravel. The lake level, and hence the deltas also, was at approximately 600 ft. above sea level, and it is at this level that these gravel deposits are now found.

Stops were made near Ottawa, Ill., to

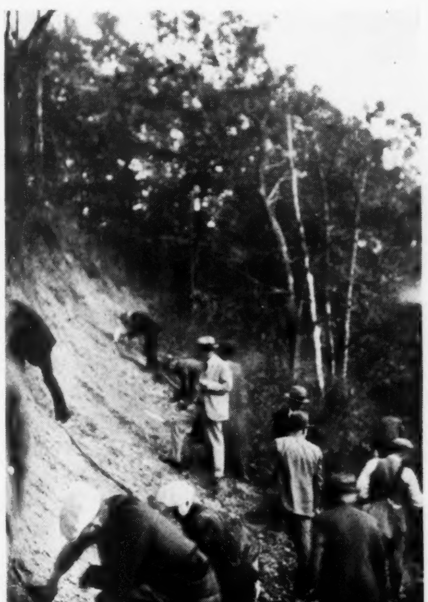
study the St. Peter sandstone, which, because it comes near the surface there, has made that city one of the largest producing points for silica sand in the world. This stone has weathered so much that it can be quarried by hydraulic means. The limestone quarry of the Alpha Portland Cement Co. plant at La Salle was visited, as was also the Margraf company quarry at Joliet, Ill. In the latter quarry two different strata were noted, the newer Niagaran (Joliet) limestone overlying the Kankakee limestone.

The association meeting took on an international aspect, since Dr. Coleman of the University of Toronto, Canada, and Dr. D. J. Mushketov, chief of the geologic survey of Soviet Russia, were present. Dr. Mushketov is in this country to study the geological surveys of the various states and of the United States, with the intention of establishing a similar system in his own country. The doctor, who is very different from the American conception of what a Russian should be (since he wore no long black beard, and displayed a keen sense of humor), was delighted to meet so many state geologists all at one place, instead of having to go to each state to find the men he wanted to interview. In appreciation of this convenience, the Russian chief geologist presented a series of lantern slides detailing the resources of his country and showing by comparison with our own resources how difficult it is to reach this great natural wealth.

***What These Meetings Can Accomplish***

Probably the most important thing brought out in the entire meeting was the point that since this group was gathered from all sections of the United States to the state of Illinois, they had the opportunity of studying for the first time the mineral resources of that state. They were able to see for themselves the varied products obtained in the state and the great ease with which most of them can be taken from the ground. Consequently this group of men are now qualified to advise correctly producers of rock products, and manufacturers who use the products, as to the availability and quality of the resources in which they are interested in Illinois. It can be readily seen that this knowledge can be of great value if they avail themselves of this source and, furthermore, when this knowledge is extended to include more states through subsequent annual meetings of the association, it will be of incalculable value in choosing locations for industries at the natural deposits where the quantity is sufficient and quality good.

***Margraf Stone Co. quarry, showing upper strata of Niagaran limestone overlying Kankakee limestone***



***Studying deposits at Mazon Creek, near Morris, Ill.***

***Split Rock, La Salle county, Ill. St. Peter sandstone overlying Platteville limestone***

## Large Soapstone Deposit Discovered in Maine

BLASTING used in connection with road repair work near East Lebanon, Maine, recently uncovered a deposit of soapstone which promises to be of considerable extent. It had been supposed, hitherto, that the deposits in New England has been about exhausted.

The stone is exposed in several places near the point of discovery, but had never been recognized before. The deposit is principally on the farm of Richard E. Hersom. It is probable that a plant for the quantity production of the stone will be established shortly.

## Effect of Grading and Type of Aggregate to Be Studied

AMONG the new research projects initiated during the current year by the U. S. Bureau of Public Roads is a project to determine how quality and economy in concrete construction are effected by variations in type and grading of coarse aggregate. It is planned to obtain a number of representative coarse aggregates such as trap, granite, limestone, sandstone and dolomite rock and glacial, siliceous and calcareous gravels, and blast-furnace slag, selecting a total of 18 aggregates in all. These are to be prepared in six different gradings:

| Grading No. | Total passing, square opening: 1/8-in. Pct. | 1/4-in. Pct. | 3/4-in. Pct. | 1 1/4-in. Pct. | 2-in. Pct. |
|---|---|---|---|---|---|
| 1 | 0 | 0 | 15 | 40 | 100 |
| 2 | 0 | 0 | 30 | 55 | 100 |
| 3 | 0 | 5 | 45 | 70 | 100 |
| 4 | 0 | 5 | 45 | 100 | 100 |
| 5 | 0 | 10 | 65 | 100 | 100 |
| 6 | 0 | 10 | 100 | 100 | 100 |

# Portland Cement, Lime and Crushed Stone Production in 1926

ROCK PRODUCTS estimates of portland cement production, shipments and average price for 1926, published in the annual review number, December 25, 1926, are closely verified by the final figures, just made public by the U. S. Department of Commerce. The figures do not vary much from the preliminary estimates of the Department of Commerce, published in ROCK PRODUCTS, January 22, 1927. The final figures are given as follows:

Production of portland cement in 1926—164,530,170 bbl.—was the largest quantity manufactured thus far in any year, exceeding that in 1925, the next highest year in production, by 2%.

Shipments of portland cement from mills in 1926 amounted to 162,187,090 bbl., valued at $277,965,473, an increase of 3% in quantity and a decrease of 0.2% in gross value. The average factory price per barrel in bulk in 1926 was $1.71, a decrease of 6 cents per barrel as compared with 1925.

Stocks at the mills also increased, reaching a total of 20,679,253 bbl. on December 31, 1926, the greatest at the end of any year during which official records of stocks have been kept. They were about 13% higher than at the end of 1925.

From the reports of the producers showing mill shipments of portland cement into the various states estimates of per capita consumption in the accompanying table have been compiled. These are at best but approximations, as they represent only the records of mill shipments into states; they do not include the imports, which would increase the consumption in certain states near the Canadian border and the seaboard, nor do they make allowance for a variable but considerable stock of cement at all times in transit, in warehouses at distributing points and awaiting use at jobs.

The commercial capacity for production of finished portland cement of the 140 plants active at the end of 1926 is estimated at 204,400,000 bbl. This total includes besides increased capacity due to extensions and improvements at old plants approximately 3,500,000 bbl. capacity for finished portland cement of three new plants that began operating during the year and are located as follows: one each in California, Ohio and Pennsylvania. The total production for the year 1926 was 80.5% of the indicated capacity at the close of the year. The corresponding figure for 1925 was 83.5%.

SHIPMENTS OF DOMESTIC PORTLAND CEMENT FROM MILLS INTO STATES AND PER CAPITA, 1925 AND 1926, IN BARRELS*

| State | 1925 Total | 1925 Per capita* | 1926 Total | 1926 Per capita* |
|---|---|---|---|---|
| Albama | 2,084,922 | 0.85 | 1,981,011 | 0.78 |
| Arizona† | 423,523 | 1.04 | 426,261 | 0.96 |
| Arkansas† | 800,407 | 0.43 | 769,808 | 0.40 |
| California | 12,433,619 | 3.09 | 12,691,277 | 2.94 |
| Colorado | 1,152,498 | 1.13 | 1,138,301 | 1.07 |
| Connecticut† | 1,758,443 | 1.15 | 1,856,786 | 1.16 |
| Delaware† | 401,923 | 1.71 | 360,193 | 1.50 |
| District of Columbia† | 886,236 | 1.78 | 907,342 | 1.72 |
| Florida† | 4,150,091 | 3.28 | 4,373,917 | 3.32 |
| Georgia | 1,438,009 | 0.47 | 1,831,276 | 0.58 |
| Idaho† | 258,553 | 0.53 | 443,737 | 0.85 |
| Illinois | 14,404,947 | 2.07 | 14,066,500 | 1.95 |
| Indiana | 4,997,971 | 1.63 | 5,174,533 | 1.66 |
| Iowa | 2,704,872 | 1.08 | 2,826,839 | 1.17 |
| Kansas | 2,257,447 | 1.25 | 2,286,661 | 1.26 |
| Kentucky | 1,796,397 | 0.72 | 1,659,087 | 0.66 |
| Louisiana† | 1,100,099 | 0.59 | 1,187,453 | 0.62 |
| Maine† | 333,829 | 0.43 | 548,155 | 0.69 |
| Maryland | 2,127,479 | 1.38 | 2,318,564 | 1.47 |
| Massachusetts† | 3,418,028 | 0.83 | 2,982,987 | 0.71 |
| Michigan | 9,564,976 | 2.31 | 10,784,049 | 2.45 |
| Minnesota | 3,615,328 | 1.41 | 3,572,711 | 1.35 |
| Mississippi† | 579,239 | 0.32 | 804,351 | 0.45 |
| Missouri | 5,600,510 | 1.62 | 5,201,961 | 1.49 |
| Montana | 235,525 | 0.36 | 257,741 | 0.37 |
| Nebraska | 1,674,944 | 1.24 | 1,554,967 | 1.12 |
| Nevada† | 100,997 | 1.30 | 94,644 | 1.22 |
| New Hampshire† | 426,138 | 0.95 | 438,350 | 0.97 |
| New Jersey | 7,082,207 | 2.02 | 7,116,109 | 1.93 |
| New Mexico† | 181,927 | 0.48 | 192,718 | 0.50 |
| New York | 18,488,762 | 1.66 | 20,224,702 | 1.79 |
| North Carolina† | 3,024,621 | 1.10 | 3,731,959 | 1.31 |
| North Dakota† | 341,841 | 0.50 | 402,546 | 0.63 |
| Ohio | 9,221,005 | 1.46 | 9,683,538 | 1.47 |
| Oklahoma | 2,377,673 | 1.06 | 2,343,201 | 1.00 |
| Oregon | 1,318,163 | 1.56 | 1,318,252 | 1.50 |
| Pennsylvania | 14,932,787 | 1.60 | 13,839,552 | 1.44 |
| Rhode Island† | 711,391 | 1.05 | 634,626 | 0.92 |
| South Carolina† | 864,166 | 0.49 | 638,972 | 0.35 |
| South Dakota | 461,726 | 0.68 | 423,831 | 0.62 |
| Tennessee | 1,644,029 | 0.68 | 1,933,409 | 0.78 |
| Texas | 4,188,910 | 0.82 | 4,877,987 | 0.92 |
| Utah | 381,018 | 0.77 | 461,338 | 0.90 |
| Vermont† | 217,286 | 0.62 | 271,615 | 0.77 |
| Virginia | 1,648,744 | 0.67 | 1,733,734 | 0.69 |
| Washington | 2,427,263 | 1.64 | 2,021,986 | 1.31 |
| West Virginia | 1,487,663 | 0.93 | 1,679,574 | 1.01 |
| Wisconsin | 4,105,100 | 1.47 | 4,621,975 | 1.60 |
| Wyoming† | 225,170 | 1.01 | 188,590 | 0.80 |
| Unspecified | 59,272 | ...... | 60,031 | ...... |
| | 156,117,674 | 1.38 | 160,939,707 | 1.37 |
| Exports reported by manufacturers but not included above‡ | 1,177,538 | ...... | 1,247,383 | ...... |
| Total shipped from cement plants | 157,295,212 | ...... | 162,187,090 | ...... |

*Per capital figures based on estimate of population made by the Bureau of Census.
†Noncement-producing state.
‡Includes shipments to Alaska, Hawaii and Porto Rico

### *Lime*

ROCK PRODUCTS estimates of lime production in 1926, in the annual review number, it seems were considerably too optimistic. There was actually a slight decrease in quantity, according to the final figures of the Department of Commerce. Our estimated average price in 1926, on the other hand, was very nearly correct as compared with the estimated average price of the Department of Commerce. The editors trust they will get a little better co-operation from the lime industry this year, and avoid a similar error. The Department of Commerce figures are as follows:

SHIPMENTS OF HYDRATED LIME FROM PLANTS IN THE UNITED STATES AND IN OHIO, 1925-26*

| Shipped to— | 1925 From all plants Short tons | 1925 From all plants Distribution | 1925 From Ohio plants Short tons | 1925 From Ohio plants Distribution | 1925 From Ohio plants Group total | 1926 From all plants Short tons | 1926 From all plants Distribution | 1926 From Ohio plants Short tons | 1926 From Ohio plants Distribution | 1926 From Ohio plants Group total |
|---|---|---|---|---|---|---|---|---|---|---|
| Ill., Ind., Mich., Ohio | 450,555 | 29.0% | 365,249 | 47.0% | 81.1% | 449,503 | 28.1% | 349,777 | 46.6% | 77.8% |
| Del., D. C., Md., N. J., N. Y., Penn., W. Va. | 613,701 | 39.5% | 261,273 | 33.6% | 42.6% | 628,398 | 39.3% | 258,126 | 34.4% | 41.1% |
| Conn., Me., Mass., N. H., R. I., Vt. | 54,819 | 3.5% | 21,717 | 2.8% | 39.6% | 67,709 | 4.2% | 20,963 | 2.8% | 31.0% |
| Fla., Ga., N. C., S. C., Va. | 172,432 | 11.1% | 71,395 | 9.2% | 41.4% | 172,082 | 10.8% | 61,771 | 8.3% | 35.9% |
| Ala., Ky., La., Miss., Tenn. | 68,271 | 4.4% | 22,833 | 2.9% | 33.4% | 72,254 | 4.5% | 21,204 | 2.8% | 29.3% |
| Ark., Iowa., Kans., Minn., Mo., Nebr., Okla., Tex., Wis. | 141,286 | 9.1% | 33,496 | 4.3% | 23.7% | 167,265 | 10.5% | 34,730 | 4.6% | 20.8% |
| Ariz., Calif., Colo., Idaho, Mont., Nev., N. Mex., N. Dak., Oreg., S. Dak., Utah, Wash., Wyo. | 51,915 | 3.4% | 1,301 | 0.2% | 2.5% | 41,348 | 2.6% | 3,461 | 0.5% | 8.4% |
| | 1,552,979 | 100.0% | 777,264 | 100.0% | 50.0% | 1,598,559 | 100.0% | 750,032 | 100.0% | 46.9% |

*Figures cover over 99% of total shipments of hydrated lime

The lime sold by producers in the United States in 1926 amounted to 4,560,398 short tons, valued at $41,566,452, according to figures obtained from the compilation of reports of lime manufacturers to the Bureau of Mines, Department of Commerce. This represents a decrease of less than 1% in quantity and of 2% in value as compared with 1925. Sales of hydrated lime, which are included in these figures, amounted to 1,606,811 tons, valued at $15,182,460, an increase of 3% in quantity and a small decrease in value. The average unit value of all lime showed a decrease from $9.30 a ton in 1925 to $9.11 in 1926, and that of hydrated lime a decrease from $9.79 a ton in 1925 to $9.45 a ton in 1926.

Sales of lime used in the manufacture of chemicals—1,943,065 tons, valued at $16,186,185—increased 3% in quantity; lime sold for construction—2,320,323 tons, valued at $23,227,034—decreased 3% in quantity; and that sold for agricultural purposes—297,010 tons, valued at $2,153,233—was only slightly less than in 1925. The following table shows sales of lime by uses in 1925 and 1926:

LIME SOLD BY PRODUCERS IN THE UNITED STATES, 1925 AND 1926, BY USES

| Use | 1925 Short tons | 1925 Value | 1926 Short tons | 1926 Value |
|---|---|---|---|---|
| Agricultural | 298,976 | $ 2,129,169 | 297,010 | $ 2,153,233 |
| Building | 2,387,267 | 24,115,420 | 2,320,323 | 23,227,034 |
| Chemical: | | | | |
| Glass works | 73,011 | $ 622,909 | 84,263 | $ 713,321 |
| Metallurgy | 411,190 | 3,007,228 | 408,234 | 2,860,338 |
| Paper mills | 376,670 | 3,174,851 | 423,322 | 3,492,996 |
| Refractory lime (dead-burned dolomite) | 392,147 | 3,730,510 | 386,715 | 3,593,731 |
| Sugar refineries | 19,089 | 280,985 | 15,379 | 238,188 |
| Tanneries | 62,933 | 557,187 | 66,536 | 584,296 |
| Other uses | 559,540 | 4,990,882 | 558,616 | 4,703,315 |
| Total chemical | 1,894,580 | $16,364,552 | 1,943,065 | $16,186,185 |
| | 4,580,823 | $42,609,141 | 4,560,398 | $41,566,452 |
| Hydrated lime (included in above totals) | 1,560,848 | $15,287,461 | 1,606,811 | $15,182,460 |

Ohio, the largest producing state (1,056,589 tons, valued at $10,348,880 in 1926), showed a decrease of 3% in quantity reported, and Pennsylvania (794,196 tons, valued at $6,303,312, in 1926), which ranks second, produced approximately the same quantity as in 1925. Both states showed decreased sales of building and agricultural lime and increased sales of chemical lime. Increases and decreases in sales as compared with 1925 were shown by many of the states, but in no instance was the change of any particular note. Although lime-manufacturing plants are distributed throughout the United States, there is much interstate shipment, and the following table shows the shipments of lime in 1925 and 1926 by approximate freight destinations:

SHIPMENTS OF LIME IN 1925 AND 1926, BY FREIGHT DESTINATIONS, IN SHORT TONS

| Destination | 1925 Hydrated lime | 1925 Quicklime | 1925 Total | 1926 Hydated lime | 1926 Quicklime | 1926 Total |
|---|---|---|---|---|---|---|
| Ill., Ind., Mich., Ohio | 450,555 | 714,223 | 1,164,778 | 449,503 | 697,928 | 1,147,431 |
| Del., D. C., Md., N. J., N. Y., Penn., W. Va. | 613,701 | 1,094,206 | 1,707,907 | 628,398 | 1,046,206 | 1,674,604 |
| Conn., Me., Mass., N. H., R. I., Vt. | 54,819 | 262,707 | 317,526 | 67,709 | 234,995 | 302,704 |
| Fla., Ga., N. C., S. C., Va. | 172,432 | 154,149 | 326,581 | 172,082 | 142,532 | 314,614 |
| Ala., Ky., La., Miss., Tenn. | 68,271 | 279,713 | 347,984 | 72,254 | 289,778 | 362,032 |
| Ark., Iowa, Kans., Minn., Mo., Nebr., Okla., Tex., Wis. | 141,286 | 301,249 | 442,535 | 167,265 | 286,780 | 454,045 |
| Ariz., Calif., Colo., Idaho, Mont., Nev., N. Mex., N. Dak., Oreg., S. Dak., Utah, Wash., Wyo. | 51,915 | 196,149 | 248,064 | 41,348 | 195,653 | 237,001 |
| Unspecified | 7,869 | 17,579 | 25,448 | 8,252 | 59,715 | 67,967 |
| | 1,560,848 | 3,019,975 | 4,580,823 | 1,606,811 | 2,953,587 | 4,560,398 |

Of the hydrated lime sold by producers in the United States in 1926, Ohio produced 752,764 tons, or 47%. Of this, 726,803 tons (97%) was sold for construction and was widely distributed throughout the continental United States. The table on the preceding page shows tonnage distribution as reported to the Bureau of Mines, presented for blocks of contiguous states roughly comprising various freight-rate zones for 1925 and 1926.

### *Stone*

Our estimate of crushed stone production in 1926, published December 25, 1926, was also a little optimistic, according to the Department of Commerce figures—including rubble, riprap, crushed stone, furnace flux, refractory stone, etc., the total is 112,265,930 tons. The full statistics follow:

Production of stone in the United States in 1926, exclusive of stone manufactured into lime, cement and abrasive materials, or crushed into sand, amounted to more than 124,476,360 short tons, valued at $188,308,590, according to compilation of reports from producers made by the United States Bureau of Mines, Department of Commerce. The figures show an increase of 7% over the 1925 production figure of 115,851,370 short tons.

Stone sold as building stone, flagstone, crushed stone, flux refractory stone, riprap and miscellaneous uses increased in quantity and stone sold as monumental stone, paving blocks, rubble, curbing and for manufacturing industries decreased.

### *Building Stone*

The building stone sold amounted to 33,342,420 cu. ft.—9% more than in 1925. This includes stone for architectural work and relatively low-priced stone for rough construction, such as foundation, bridges and unshaped face stone for buildings and retaining walls.

More than one-half of the building stone sold was limestone, 18,412,950 cu. ft., valued at $20,391,597, this quantity being 15% more than in 1925. The largest quarry center for building limestone, the Bedford-Bloomington district in Indiana, reported total sales from the quarries of 14,171,490 cu. ft. in 1926, valued at $18,063,148, an increase of 20% in quantity over 1925. Of this total 5,747,510 cu. ft., valued at $3,510,665, was sold as rough stone; 4,982,780 cu. ft., $4,654,126, sawed stone; 513,460 cu. ft., $1,047,692, semi-finished stone, and 2,927,740 cu. ft., $8,850,665, cut stone. The mills of this district not operated in connection with the quarries reported sales of 402,250 cu. ft. of sawed and semi-finished stone, valued at $414,416 and 1,109,000 cu. ft. of cut stone valued at $3,658,855. High-grade building limestone quarried at Russellville, Ala., amounted to 135,600 cu. ft.; at Bowling Green, Ky., to 134,460 cu. ft.; at Mankato and Kasota, Minn., to 245,330 cu. ft.

Total sales of granite for building stone (8,181,910 cu. ft., valued at $6,883,513) represented nearly one-fourth of the building stone produced in 1926, and an increase of 9% in quantity over 1925. The granite sold for architectural work, including rough and dressed stone, was 2,076,560 cu. ft., valued at $6,031,248, a small decrease in both quantity and value. Granite sold for rough construction showed increased sales. The principal states producing granite for architectural building stone were Maine (561,470 cu. ft.), Massachusetts (512,480 cu. ft.), California (189,240 cu. ft.), North Carolina (182,890 cu. ft.), New Hampshire (166,810 cu. ft.), Georgia (115,590 cu. ft.) and Minnesota (87,450 cu. ft.). Pennsylvania, Massachusetts and Maryland produced a considerable quantity of granite for rough construction work.

Total sales of sandstone for building (3,346,550 cu. ft., valued at $3,154,207), a small decrease in quantity from 1925. Sandstone for architectural work, including rough, sawed and finished stone, amounted to 2,536,770 cu. ft., valued at $3,057,015, an increase in quantity of 5%. Ohio produced 1,747,030 cu. ft. Kentucky, New York, Pennsylvania, Washington and other states also reported considerable amounts.

Marble sold for building stone in 1926 amounted to 2,867,940 cu. ft., valued at $9,419,939, practically the same quantity as in 1925. The principal states producing building marble are Tennessee (909,580 cu. ft.), Missouri (655,210 cu. ft.), Vermont (797,990 cu. ft.) and Georgia (130,180 cu. ft.). Alabama, Alaska, Arkansas, California, Colorado, Maryland, Massachusetts, New Jersey, New York, North Carolina, Pennsylvania and Utah also furnish marble for building purposes. The product from Georgia and Missouri is chiefly for exterior building and that from Tennessee and Vermont for interior work. Serpentine (58,430 cu. ft., valued at $423,358) quarried in Maryland, Massachusetts, New Jersey, Pennsyl-

vania and Vermont is included in the marble figures. There was also sold 11,800 short tons of serpentine, valued at $51,358, chiefly for stucco and terrazzo work. The total sales of marble reported from Carthage, Mo., for 1926 were 459,580 cu. ft., valued at $1,056,452, a decrease in quantity of 11% from 1925. This includes a small quantity of monumental stone. Marble quarried at Phenix, Mo., chiefly for interior building work, amounted to 214,600 cu. ft. in 1926.

Basalt and various miscellaneous varieties of stone used chiefly for rough construction showed decreased output for 1926.

#### *Monumental and Memorial Stone*

Stone sold for monumental and memorial work in 1926 amounted to 4,335,770 cu. ft., valued at $14,580,929, a decrease of less than 1% in quantity.

Granite (including rough and dressed stone) reported as sold for this purpose was 3,240,550 cu. ft., valued at $10,533,072, an increase of 1% in quantity. The principal states producing granite for monumental work in 1926 were Vermont (1,282,830 cu. ft., of which the Barre district produced 1,062,160 cu. ft.), Massachusetts (340,950 cu. ft., of which the Quincy district produced 278,350 cu. ft.), Minnesota (245,200 cu. ft.), Rhode Island (241,490 cu. ft.), Maine (159,220 cu. ft.), New Hampshire (130,400 cu. ft.), Georgia (135,670 cu. ft.), Wisconsin (131,990 cu. ft.) and California (73,770 cu. ft.).

Sales of marble for monumental work (including rough and finished stone) in 1926 were reported as 1,095,220 cu. ft., valued at $4,047,857, a decrease of 7% in quantity. Vermont produced 624,840 cu. ft., Georgia 389,680 cu. ft. and Alabama, Arkansas, Massachusetts, Missouri, New York, North Carolina and Tennessee much smaller amounts.

#### *Street and Road Work and Concrete*

Street and road material in general showed increased sales in 1926, although sales of paving blocks (39,563,180 blocks, valued at $3,399,602) decreased 1% in quantity, and stone sold for curbing (4,409,930 cu. ft., valued at $4,303,280) decreased 13%. Stone sold for flagstone (902,424 cu. ft., valued at $657,435) increased 18% in quantity. Total crushed stone amounted to 82,515,160 short tons, valued at $87,872,014 in 1926, an increase of 9% in quantity. Crushed stone for concrete and road work (66,892,530 tons, valued at $75,049,930) increased 6% in quantity, and crushed stone reported as used for railroad ballast (15,623,030 tons, valued at $12,822,084) increased 22%.

#### *Fluxing Stone*

Stone sold for fluxing to blast furnaces, open hearth steel works, smelters and other metallurgical plants amounted to 23,859,390 short tons, valued at $18,049,012, an increase of 4% in quantity.

#### *Refractory Stone*

Stone reported for refractory use, which includes dolomite, quartzite and mica schist, amounted to 1,531,070 short tons, valued at $1,925,832, in 1926, an increase in quantity of 21%. Raw dolomite reported as sold for the manufacture of refractories in 1926 amounted to 511,300 short tons, valued at $458,802. Besides this quantity, operators who both quarry and dead-burn or sinter dolomite reported 386,715 tons of sintered material, valued at $3,593,731. The quantity of raw dolomite reported was 23% more than in 1925, and the sintered material decreased slightly. Quartzite (ganister) used in the manufacture of refractory brick, for furnace lining and for the manufacture of ferrosilicon, amounted to 984,470 short tons, valued at $1,321,824. This was an increase of 22% in quantity. Sales of mica schist for furnace and kiln lining, which is quarried in Montgomery county, Pennsylvania, near Edge Hill, amounted to 35,300 tons, valued at $145,206, a decrease in quantity of 7%.

Sales in 1926 of pulverized limestone for agricultural use amounted to 1,850,620 tons, valued at $3,064,235, a decrease of 5% in quantity over the sales for 1925.

The accompanying table shows the sales of stone in 1926 by uses and the sales for 1925 for comparison.

STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES, 1925 AND 1926, BY USES

| | 1925 | | 1926 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| Building stone ............cubic feet | 30,695,310 | $ 35,444,809 | 33,342,420 | $ 39,922,851 |
| Approximate equivalent in short tons............ | 2,392,420 | ............ | 2,589,190 | ............ |
| Monumental stone............cubic feet | 4,371,380 | 14,404,339 | 4,335,770 | 14,580,929 |
| Approximate equivalent in short tons............ | 363,060 | ............ | 359,950 | ............ |
| Paving blocks ............number | 40,143,220 | 3,680,687 | 39,563,180 | 3,399,602 |
| Approximate equivalent in short tons............ | 380,710 | ............ | 366,370 | ............ |
| Curbing ............cubic feet | 5,075,620 | 4,313,446 | 4,409,930 | 4,303,280 |
| Approximate equivalent in short tons............ | 393,460 | ............ | 346,020 | ............ |
| Flagging ............cubic feet | 762,280 | 562,344 | 902,424 | 657,435 |
| Approximate equivalent in short tons............ | 55,790 | ............ | 66,330 | ............ |
| Rubble ............short tons | 1,197,170 | 2,060,868 | 539,670 | 917,433 |
| Riprap ............short tons | 3,079,270 | 2,794,379 | 4,060,280 | 4,652,717 |
| Crushed stone............short tons | 75,672,930 | 80,508,429 | 82,515,560 | 87,872,014 |
| Furnace flux (limestone and marble)......short tons | 22,860,890 | 17,344,190 | 23,859,390 | 18,049,012 |
| Refractory stone (ganister, mica schist and dolomite) ............short tons | 1,261,130 | 1,548,190 | 1,531,070 | 1,925,832 |
| Manufacturing industries (limestone and marble).. ............short tons | 5,171,520 | 4,941,669 | 4,953,800 | 4,376,026 |
| Other uses* ............short tons | 3,023,020 | 6,613,442 | 3,288,730 | 7,651,459 |
| Total (quantities approximate in short tons).. | 115,851,370 | $174,216,792 | 124,476,360 | $188,308,590 |

*Chiefly agricultural limestone.

## Production of Natural Abrasives in 1926

THE total quantity of natural abrasives sold by producers in the United States in 1925 was about 225,000 short tons, valued at over $4,500,000, according to a statement compiled by the United States Bureau of Mines, Department of Commerce, from individual reports furnished by producers. In addition, there were manufactured and sold during the year 73,603 short tons of artificial abrasives, valued at $6,751,165, divided as follows: Carbides, 17,026 short tons, valued at $1,702,037; aluminum oxides, 43,967 short tons, valued at $4,106,699, and metallic abrasives, 12,610 short tons, valued at $942,429.

NATURAL ABRASIVES SOLD BY PRODUCERS IN THE UNITED STATES, 1925-26

| | 1925 | | 1926 | |
|---|---|---|---|---|
| Abrasive | Short tons | Value | Short tons | Value |
| Diatomaceous earth ............ | 73,030 | $922,281 | 87,126 | $1,081,564 |
| Emery ............ | 769 | 5,907 | 386 | 3,641 |
| Garnet ............ | 8,429 | 712,853 | 6,397 | 523,875 |
| Grinding pebbles and tube-mill lining............ | 3,831 | 50,147 | 6,219 | 85,146 |
| Grindstones ............ | 28,970 | 864,637 | 28,669 | 875,240 |
| Millstones, chasers and dragstones............ | (*) | 22,490 | (*) | 45,937 |
| Oilstones, whetstones, hones, scythe-stones and rubbing stones ............ | 970 | 272,224 | 1,640 | 218,359 |
| Pulpstones ............ | 8,370 | 841,302 | 9,670 | 997,994 |
| Pumice ............ | 40,380 | 179,020 | 53,887 | 208,504 |
| Tripoli ............ | 29,388 | 434,886 | 31,369 | 523,609 |

*Quantity not reported by weight.

## Canadian Asbestos in 1926

ASBESTOS production in Canada during 1926 reached a grand total of 279,403 tons, with a valuation of $10,099,423 as compared with a total production of 273,524 tons valued at $8,977,546 in 1925. The average value received by the operators in 1926 was $36.15 while in the previous year the average value was $32.82 per ton.

Asbestos rock mined during the year totalled 4,483,375 tons, of which quantity 4,002,626 tons were handled in the mills. Exports of asbestos, including sand and waste, amounted to 277,991 tons in 1926 or 19,974 tons in excess of the tonnage exported in 1925. The United States imported the greater part of the Canadian product, taking in all 244,334 tons.

Capital employed in the industry in 1926 totaled $34,905,096 divided among eight producing firms. Employment was furnished to 141 salaried employees, 1521 mine workers and 1135 mill workers.

Manufactures of asbestos and allied products during the year amounted in value to $1,530,094, an increase of about 14% over the total for the previous year. Fourteen plants were engaged in the industry as compared with 12 in the previous year. Products of the industry include boiler and pipe covering, linings, lumber, paper and shingles.

Imports of asbestos products were valued at $565,635 while exports amounted to only $43.011.

## Dolomite, Inc., to Operate Sturgeon Bay Quarry

H. P. EELLS, JR., president of Dolomite Inc., Cleveland, Ohio, informs ROCK PRODUCTS that it has purchased the Leathem D. Smith stone quarry at Sturgeon Bay, Wis., for the sum of $675,000, Mr. Smith to retain the ownership of the docks and shipyards.

The Dolomite company expect to double the present annual output of 450,000 tons, and to that end will make extensive changes and improvements so as to put the operation on a similar plane as regards efficiency with their other plant at Maple Grove, Ohio. The latter plant has been recently rebuilt to give a capacity of 400 to 500 tons an hour.

Dolomite, Inc., produce a dead burned dolomite which is sold under the trade name of "Magnefer," as well as fluxing stone, crushed stone and agricultural limestone.

## New York Building Material Dealers to Fight Fraudulent Bankruptcies

FRAUDULENT bankruptcies and failures are no longer going to be profitable in the building business if programs now being laid down are followed, writes Allen E. Beals in the current *Dow Service Daily Building Reports.*

Contracting plumbers, heating and piping firms, building material dealers of New York city and state and other building construction interests operating under the present New York mechanics lien law, permanently organized at the Engineering Societies building recently and resolved to offer the next New York state legislature an amendment which closely follows that proposed by upstate building material dealers and building crafts who were represented at the meeting by M. T. Bannigan of Utica:

"Whereas, The increase in the number of mechanics liens filed daily is proof of the need of steps being taken to meet this grave situation in the most practical and effective way, be it therefore

"Resolved, That at the next session of the legislature of this state we offer for enactment the following measure:

"1. Any person, firm or corporation securing a building loan is civilly and criminally liable if the funds obtained on such loans are used or diverted for or to any other purpose than that of paying the valid and legitimate charges and costs of the construction of the particular building or buildings for which the loan was made or secured.

"2. All building contracts to be filed and recorded in the office of the county clerk.

"3. After building contracts have been awarded, no further mortgages are to be placed on the property unless subordinated to the contractor's or material man's right of lien and contractor's or material man's claims."

There apparently is a growing public protest against that feature of the present mechanics lien law of New York that permits a borrower of building funds to divert them into other channels having no relation to the purpose for which the loan was made. Small investors who are pouring their savings into building mortgages are evidently interesting themselves in this reform which calls for the maintenance of a sound and healthy business relationship between the borrower of thrift funds and building material purveyor and contractor on the job.

The situation has, in fact, become so bad that New York lumber retailers and wholesalers cannot wait even until January, when the next legislature meets, for relief. On October 6 they organized what has developed into the New York Lumber Trade Holding Co., with Frank A. Niles, president; William E. Code, vice-president, and Herbert B. Coho, secretary and treasurer.

This company will buy up lumber that gets into the bankruptcy court or into receivers' hands. It will then distribute these stocks to their members. Each failure will be handled by a committee appointed by the directors and each committee will appraise the lumber and advise the board how much, in their judgment, it is worth. An important part of each committee's duties will be to review all of the conditions and causes of the distress of the business they have been appointed to investigate, and giving all the facts so obtained the fullest possible publicity.

## Cement—The New Business Barometer

A NEW barometer of business conditions has been established by the Department of Commerce by including each month in the statistics of the cement industry a figure showing the ratio of production to total capacity. This places the cement industry on the same statistical basis as the steel industry in that its operation ratio, production, shipments and stocks on hand will be made public monthly.

The statement for the month of September establishes the total capacity of the cement industry, as of September 30 last, at 229,020,000 bbl. This capacity, established by rates of production sustained over continuous periods of three months by each of the plants, indicates a total capacity for the year 1926 of at least 215,300,000 bbl.

Since January 1, 1927, new plants and extensions and betterments in old plants have raised this capacity, on August 31, 1927, to at least 228,300,000 bbl. a year, and on September 30, 1927, to at least 229,020,000 bbl. On the basis of these revised estimates the 1926 production amounted to 76.4% of capacity.

The August, 1927, output represented approximately 94.4% of the capacity of the plants for that month and the production for the first eight months of the year was 75.2% of the capacity available during that period. Corresponding figures for September and for the first nine months of the year are 92.2% and 77.2% respectively.

## Fluorspar Producers in Illinois-Kentucky Field Seek Higher Tariff Rates

THE United States Tariff Commission announced orally recently the receipt of a brief filed on behalf of the fluorspar producers of the Illinois-Kentucky field, applicants for an increase of 50% in the present tariff duties on imported fluorspar. The brief stated that there was no substantial difference in quality between domestic and imported metallurgical spar and no adjustment required. The brief also pointed out that it had no objection to a reclassification of acid spar but argued if reclassifications are made they should be based on chemical analysis. The brief also said that conditions in the industry were precarious.

The full text of a summary of the brief follows:

The widening of the domestic market that would result from an increase in duty will be sufficient to permit operation by the American producers at a slight profit or at least to stop the losses they are now suffering. The industry is in an exceedingly precarious condition.

Many companies have been forced to discontinue production and others are working only half time. One company, whose officer testified at the hearing, has been shut down for seven months and is engaged in road-building work to keep its organization together and tide over the present period of depression.

The fluorspar industry is the mainstay of the towns of Rosiclare, Ill., Marion, Ky., and surrounding territories. A shutdown of the industry will be disastrous to both of these communities and their inhabitants.

In view of the deplorable condition of the American industry and the ever-increasing volume of imports that threatens to wipe out the domestic production we earnestly urge that the commission issue its report in this investigation at the earliest possible date.

## Winter Prospects for Employment Generally Good

THE general outlook for employment throughout the United States for the balance of the year is encouraging and most optimistic. This statement was made recently by the Director General of the Employment Service, Francis I. Jones, in commenting on a special survey made by the employment service relative to employment prospects in the United States for the remainder of 1927.

Director Jones in his report calls attention to increased activity in the steel, automobile, lumber and coal industries and anticipates improvements in other production industries. The bumper farm crops are expected to further aid the unskilled and common labor which at this time is generally well employed.—*United States Daily.*

# Manufacturers' Division, N. C. S. A. Holds Annual Meeting in New York

THE annual dinner meeting of the Manufacturers' Division of the National Crushed Stone Association at the Hotel Commodore, New York City, October 21, was marked by the usual enthusiasm and loyalty of this subsidiary organization to the national body. The principal business of the meeting was to talk over arrangements for the 1928 convention at West Baden, Ind., January 16-19, and to hear the plea of Otho M. Graves, president of the National Crushed Stone Association, for funds with which to equip a research laboratory. President Graves' plea for $5000 from the Manufacturers' Division was promptly acted upon, and the meeting voted to accept the responsibility of raising this sum in money or laboratory equipment.

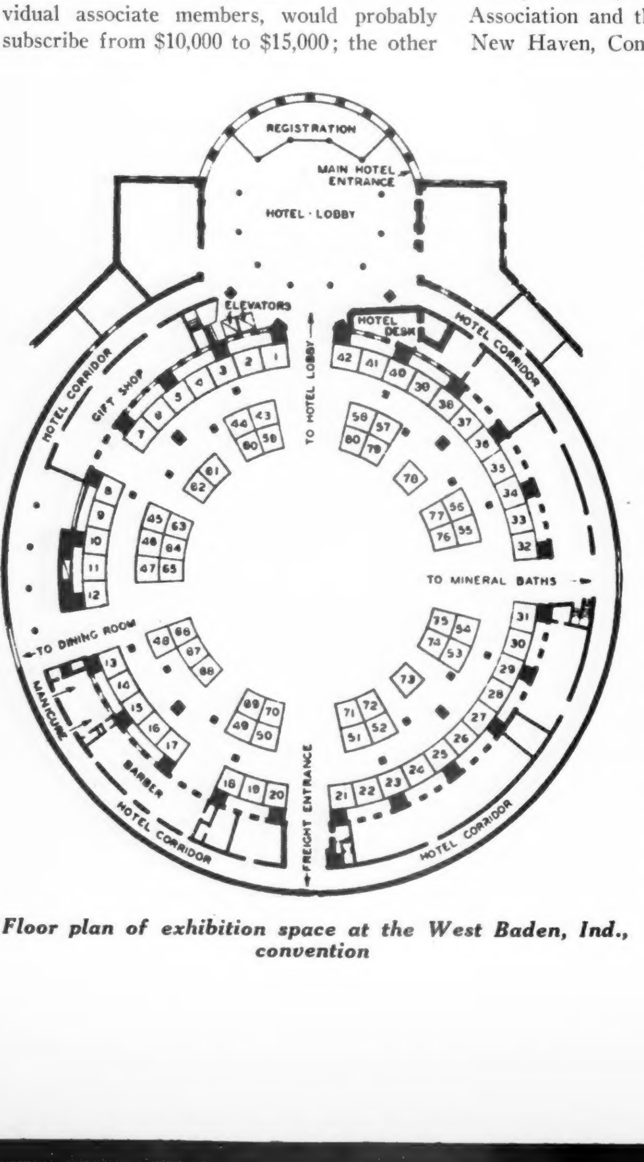
President Graves stated that subscriptions from active members of the association already totaled between $4000 and $5000, the largest single subscription ($1000) being that of John Rice, past-president of the association, president of the General Crushed Stone Co., Easton, Penn., of which company Mr. Graves is vice-president and general manager. President Graves stated that he expected contributions or subscriptions from active members to the extent of $15,000 to $20,000; that the powder manufacturers, either as an organization or as individual associate members, would probably subscribe from $10,000 to $15,000; the other associate members would doubtless contribute the required $5000 to make the fund complete.

#### *Exhibit Details*

The regional vice-presidents of the Manufacturers' Division met in the afternoon and appointed a committee consisting of L. W. Shugg, General Electric Co.; H. M. Davison, the Haywood Co., and J. R. Boyd, secretary, to award exhibit both space at the West Baden convention. Heretofore the award of space has been made by the secretary in the order in which applications were received. The accompanying floor plan shows the arrangement of booths, which is unique as regards the past exhibits of the association. The price fixed for a single booth space at West Baden is $45.

#### *Convention Program*

N. S. Greensfelder, Hercules Powder Co., chairman of the association committee on safety and welfare, announced that arrangements had been made to have one of the U. S. Bureau of Mines mine rescue cars at West Baden for the convention, with specially trained quarry crews from the France Stone Co. and the Mid-West Quarries Co. The U. S. Bureau of Mines, the National Safety Council, the National Crushed Stone Association and the Clarence Blakeslee Co., New Haven, Conn., were invited to exhibit without charge for space. The latter company represents the financial interests behind the New Haven Trap Rock Co. and the Connecticut Quarries Co., and, according to President Graves, has a very interesting and instructive exhibit of quarry operation and quarry products.




*Floor plan of exhibition space at the West Baden, Ind., convention*

Upon a motion made by N. S. Greensfelder a subcommittee of the safety and welfare committee will be appointed to consist of both active and associate members, to draw up specifications for providing proper mechanical safeguards for machinery and equipment made by members of the Manufacturers' Division.

As usual, a number of directors of the National Crushed Stone Association were the guests of the Manufacturers' Division, and made brief addresses. They were in addition to President Graves, John Rice, past-president, president, General Crushed Stone Co., Easton, Penn.; W. Scott Eames, past-president, vice-president and general manager, New Haven Trap Rock Co., New Haven, Conn.; Arthur S. Lane, president, A. S. Lane Co., Meriden, Conn.; R. B. Tyler, president, R. B. Tyler Co., Louisville, Ky.; Albert L. Worthen, vice-president and general manager, Connecticut Quarries Co., New Haven, Conn.; F. W. Schmidt, president of the Morris County Crushed Stone Co. and affiliated companies, Morristown, N. J.; James Savage, president, Buffalo Crushed Stone Co., Buffalo, N. Y.; W. L. Sporborg, president, Rock-Cut Stone Co., Syracuse, N. Y.; F. C. McKee, secretary, West Penn Portland Cement Co., Pittsburgh, Penn.; F. T. Gucker, vice-president and general manager, Dyer Quarries Co., Norristown, Penn.; Chas. M. Doolittle, president, Canada Crushed Stone Co., Ltd., Hamilton, Ont.; A. T. Goldbeck, chief of the engineering bureau of the association, and J. R. Boyd, secretary.

#### *Manufacturers' Representatives Present*

The president of the Manufacturers' Division, C. B. Andrews, of the Taylor-Wharton Iron and Steel Co., High Bridge, N. J., presided. The following members of the Manufacturers' Division were present: Gordon Buchanan, C. G. Buchanan Co., New York City; N. S. Greensfelder, Hercules Powder Co., Wilmington, Del.; W. H. Norrington, Robins Conveying Belt Co., New York City; Albert E. Reed, the W. S. Tyler Co., Cleveland, Ohio; H. M. Davison, the Hayward Co., New York City; James R. White, the Hayward Co., New York City; S. R. Russell, E. I. du Pont de Nemours and Co., Wilmington, Del.; O. B. Niesen, Trojan Powder Co., Allentown, Penn.; Benj. F. Clark, Jr., American Manganese Steel Co., New York City; Ralph C. Becker, Keystone Catalogs, New York City; Walter Magee Annette, Hercules Powder Co., New York City; L. W. Shugg, General Electric Co., Schenectady, N. Y.; E. G. Lewis, Bucyrus Co., New York City; S. E. Cole, *Pit and Quarry*, New York City; J. A. Lang, E. I. du Pont de Nemours and Co., New York City; A. H. Beggs, Keystone Catalogs, New York City; G. D. Fraunfelder, Easton Car and Construction Co., Easton, Penn.; Edward Finenerty, Vulcan Iron Works, New York City; John C. Taylor, Jr., Taylor-Wharton Iron and Steel Co., High Bridge, N. J.; W. S. Nichol, Cross Engineering Co., Carbondale, Penn.; Geo. Flounders, C. G. Buchanan Co., New York City; B. G. Dann, Hendrick Manufacturing Co., Carbondale, Penn.; W. F. Nothacker, Sanderson-Cyclone Drill Co., New York City; M. B. Garber, Thew Shovel Co., Loraine, Ohio; J. C. Houston, Browning Crane Co., New York City; Chester H. Gibbons, Marion Steam Shovel Co., New York City; H. M. Cooper, Sauerman Bros. Co., New York City; George M. Earnshaw, Rock Products, New York City; Nathan C. Rockwood, Rock Products, Chicago, Ill.

## Pyramid Portland in Receivership

H. M. POOLE, Des Moines, Iowa, coal operator and capitalist, was appointed receiver on October 25 for the Pyramid Portland Cement Co.'s $2,000,000 plant at Valley Junction, Iowa, by Judge O. S. Franklin.

The action of the court followed foreclosure proceedings instituted in the Polk county district court by approximately 200 holders of first mortgage bonds secured by the property and aggregating $800,000.

The bondholders through their trustee, the Iowa Trust and Savings Bank, set forth in their petition that the cement company has defaulted on $300,000 of the bonds and that the interest payments are also in arrears.

They ask a total judgment of $1,045,333 made up of the $800,000 principal and $245,333 interest. Under the order of the court, the receiver will handle the financial affairs of the company in the interests of the bondholders.

It was emphasized that the plant will continue to operate under lease to the Pyramid Portland Cement Co. of Delaware, and that no changes will be made in the management or operating methods.

The Pyramid plant is said to be one of the largest and most modern in Iowa. It is now employing 125 men and has a daily output of 3000 bbl. It has been running to capacity ever since April 1, and the tremendous demand for cement for Iowa's road program has created a demand which will keep the plant in operation at top speed all winter with the expectation of a necessary shutdown for repairs and overhauling.

The foreclosure includes, in addition to the local property, 85 acres of limestone land near Gilmore City, Pocahontas county, valued at more than $100,000. This is the source of the rock used at the cement mill.

The first mortgage bondholders are largely local residents and firms. The Pittsburgh-Des Moines Steel Co. was said to be the largest single holder of bonds.

H. M. Poole, receiver, will begin his duties at once. He will be required to file a $100,000 bond in compliance with Judge Franklin's order.

C. B. Hextell, attorney for the bondholders, who filed the petition, set forth that the Iowa Trust and Savings Bank, trustee, has no interest in the action and holds none of the bonds.

Concerns holding claims against the cement company, and which were named as defendants in the suit, were: Allis-Chalmers Manufacturing Co., Worthington Pump and Machine Co., Foote Bros. Gear and Machine Co., Modern Valve Bag Co., Tioga Steel and Iron Co., Cohen Bros. Iron and Metal Co., Charles Weitz' Sons, United States Fidelity and Guaranty Co., L. A. Andrew as receiver for the Iowa Loan and Trust Co. and Ed. S. Tesdell, trustee.—*Des Moines* (Iowa) *Tribune Capital.*

## A. C. Tagge President of New Canada Cement Company

A. C. TAGGE, vice-president and assistant general manager of the Canada Cement Co., Ltd., Montreal, Que., is to become president, upon the completion of the reorganization of the company. Frank P. Jones, president of the company for several years past, is to become chairman of the board.

*A. C. Tagge*

Mr. Tagge is well-known and well liked throughout the cement industry because he has taken an active interest in both the technical and humanitarian sides of his work. He has been a leader in the accident prevention work of the industry through the Portland Cement Association; for several years prior to 1927 he was chairman of the association's committee on accident prevention and insurance. His interest has been so active, in fact, that his company has won two of the P. C. A. safety trophies for mills.

The engineering profession again achieves recognition and distinction in Mr. Tagge's promotion to one of the most important executive positions in Canadian industry. He was born at Ann Arbor, Mich., in 1870 and graduated in electrical engineering at the University of Michigan in 1897.

Mr. Tagge's first work was teaching physics and chemistry at the Monroe (Mich.) High School. Subsequently he was promoted to be principal of the high school. In 1893 he left school teaching to become a draftsman with the Link-Belt Machinery Co. During a period here he also attended the University of Michigan and obtained his engineering degree.

His first connection with the portland cement industry was as engineer and superintendent of the Peninsular Portland Cement Co., Jackson, Mich. He went from there to Canada in 1901 to become engineer of the International Portland Cement Co., Ltd., at Ottawa, Ont. He was with various plants, which were later merged into the Canada Cement Co., Ltd., in 1909. He was chief engineer and general superintendent of the company for 10 years. In 1915 he was made assistant general manager and elected to the board of directors. Since then he has been more concerned with executive than with engineering and operating work, but he has never lost the balance, modesty and the ability to make logical analyses of problems of all kinds, which mark him primarily an engineer—of the Herbert Hoover type!

## E. S. Morgan Defends Price of Portland Cement in Texas

IN recent newspaper comment the portland cement companies of Texas have been accused of reaching agreements for the purpose of maintaining excessive prices for their products. The papers cited the fact that Belgian cement was imported to Houston and Dallas and sold at a lower rate than was quoted by the manufacturers whose mills were located in those two cities. E. S. Morgan, vice-president of the Texas Portland Cement Co., which owns plants in both Houston and Dallas, replied to the charges for the Texas cement interests.

Mr. Morgan claimed that the Texas-made product was sold at a fair price, but could not hope to compete in price with Belgian cement, because the cost of production in that country was so much less than in the United States. He called attention to the difference in labor costs, which are approximately four times as great in Texas as in Belgium for both skilled and unskilled labor. Furthermore, he said that the Belgian manufacturer pays only a very low tax, and is subsidized by the government. Mr. Morgan called attention to the uncertainty of the Belgian imports, declaring that if the Belgian interests found a better market at any time they would no longer ship to the Texas market. On the other hand, the Texas manufacturers have invested their capital in Texas property and are permanently located as a home industry, using materials and labor exclusively from the state of Texas.

## New Marble Company Starts Operations in Tennessee

THE Tennessee Marble and Brick Co., of Fayetteville, Tenn., a recently organized company which has taken over the properties of the National Marble Co. and the Lincoln Marble Brick Co., both of Tennessee, has commenced the operation of its newly acquired quarries. The quarries are located at Brighton, Tenn., 13 miles east of Fayetteville, and consist of 143 acres of land on which at least 14 different shades and textures of stone are said to be found. The company owns 2.7 miles of railroads and operates its own locomotive. The necessary quarry equipment of channels, derrick, pulverizers, crushers and other equipment are also owned by the company and are now in operation.

The company is equipped to furnish all types of aggregate for stucco, dash, terrazzo and concrete work, but can also furnish mill blocks if desired, according to R. W. Gaunt, secretary and treasurer. It is reported that the prices quoted by the company are particularly attractive to users of special aggregates, since the company is endeavoring to introduce its product to the purchasers.

## Northwestern Portland to Start Production Early in 1928

ANNOUNCEMENT is made by George Macdonald, president of the Northwestern Portland Cement Co., that complete subscription has come to the company's $1,000,000 of capital stock and that production of cement will commence about the first of the new year. The mill, situated at Grotto, on the Great Northern railway, east of Seattle, will be one of the most modern and efficient on the Pacific coast. Its capacity will be 2000 bbl. daily, marketed principally within the state and south of the Columbia river.

All of the buildings at the new company's plant are completed. They are of concrete and steel. According to President Macdonald, crews of workmen now are installing the rotary kiln and raw and finish grinders and other machinery and equipment. The aerial tramway, 9000 ft. in length, will deliver 90 tons of limestone hourly to the production plant.

About two-thirds of the company's capital stock has been subscribed by residents of Oregon and the remainder by Washington investors. The company's principal office is in Portland, in the Wilcox building.

Officers of the Northwestern Portland Cement Co., besides President Macdonald, are Dr. W. J. Kerr, Corvallis, Ore., vice-president; C. T. W. Hollister, Portland, secretary and director of sales. The additional directors are J. H. Nichols, Baker, Ore.; Dr. J. A. Reuter, The Dalles, Ore.; John Hastie, Seattle; H. K. Metcalf, Cottage Grove, Ore.; J. N. Teal and J. M. Dougan, Portland.—*Portland* (Ore.) *Journal of merce.*

## New Cement Process Uses More Gypsum

IT has been taken as an established fact that the amount of gypsum added to the cement clinker ought not to exceed a limit of about 4%, this percentage being also supposed to give the highest obtainable compressive strength. A Swedish engineer, M. Lantz, has now discovered that a higher percentage of gypsum may under certain conditions be ground into the cement with the effect of increasing the compressive strength and reducing the expansion of the concrete. According to the method described in the Swedish patent, the clinker is first ground with an ordinary amount of gypsum and the ground cement is then passed rapidly through another mill, where a second equal quantity of gypsum is added. Tests carried out with a cement containing originally 3% of gypsum showed an increase by about 50% of the compressive strength at a total content of 6% gypsum and at the same time the LeChatelier expansion test showed a marked improvement. The effect is explained from the fact that by the second grinding the first portion of gypsum is ground extremely fine, whereas the second portion is not ground very fine, the grain sizes of the total quantity thus being evenly distributed within very wide limits. In this way the degree of porosity of the cement mixture is reduced to a minimum and the mechanical strength of the mortar is consequently improved.—*Industrial and Engineering Chemistry.*

## Attempt to Introduce Russian Soviet Cement Fails After Year's Trial

THE last of the Russian cement, a commodity introduced into the United States more than 14 months ago, has left Pier 10, Thaten Terminals, Stapleton, Staten Island, N. Y. Two lighters carried away the remaining 20,000 bags a short time ago.

The cement, totaling 75,000 bags, or 3400 tons, arrived at Pier 10 in the hatches of the American freighter *Rushville*, July 22, 1926. At that time it was reported to be the first cargo of its kind to be sent to this country from Soviet Russia. All of it was discharged April 29.

From the first, its utilization by American contractors was doubtful. The Amtorg Trading Co., the consignees, tried every means to introduce it successfully, but, failing, sold the whole shipment in December to the Impex Trading Co., a subsidiary of the United Hardware and Tool Corp.

### *Agents Try in Vain*

The same difficulty faced the new owners. A number of agents were appointed in different sections to promote the use of the cement, and efforts were even made to dispose of several thousand bags to contractors on Staten Island. But borough engineers discouraged this plan by reporting that the product was of an inferior quality.

All sorts of inducements were offered, but contractors still hesitated to purchase it. At one depressive moment it was rumored that the whole shipment was to be transported to sea and dumped.

Two months ago, however, the cement started to move from the pier fast. About ten men were employed by the Impex company to open the bags and run their contents up an electrically motored conveyor to a grinding machine. Trucks and lighters visited the pier every day for portions of the reconditioned cement.

### *Go to South America*

The last 20,000 bags were dispatched in two loads. They were loaded into the lighters *Smelter* and *Dwyer Brothers,* belonging to the Wright & Cobb Lighterage Co., in two days. This shipment was consigned to the McCoy Asphalt Co., Mill Basin, Jamaica Bay.

This sudden movement of the cement, however, does not indicate a change in the attitude of the American market. According to a statement from the office of the Impex Trading Co., 74 Reade Street, Manhattan, the last 20,000 bags is being prepared for exportation to South America.—*Staten Island* (N. Y.) *Advance.*

## Agitation to Close Montreal Quarries Continues

IMMEDIATE steps will be taken to close at least one quarry in Rosemont, Ald. Des Roches promised a delegation of citizens from this ward who came down to the Montreal, Que., city hall to ask for protection against the operation of quarries in that district.

The city will soon put a new quarry by-law on its books which will greatly limit the operations of quarry owners, he stated. It was suggested that a time limit of three years be set when all quarries in the city would have to move beyond the limits of Montreal.

The delegation was headed by Ald. J. N. Drummond, from this ward, with Rev. F. Williamson and Rev. James Clark, and was received by Ald. Des Roches and Jarry, of the city administration.

Ald. Drummond introduced the delegates, after which several gave their opinions on the situation in no uncertain terms: Quarries were operating within 29 ft. of dwellings, they said, while the present law demanded at least 300 ft. The dust, noise, danger from blasting, weakening of foundation and depreciation of property were all explained at length. Even Sunday was not observed, as blasts were exploded every day of the week and even after usual working hours in the evening and early morning, it was alleged.

Charges of dynamite varying from 2000 lb. to from 20 to 40 tons were alleged by members of the delegation.

A stone weighing 29 lb. fell crashing through his roof, W. Appleby, describing himself as a professional rat catcher, stated.

Noises like a continuous thunder-storm, constant headaches as a result, unendurable dust, vibration and danger to children in the yards, were the description of Mrs. H. Farenberg.

Two tons of dust fell in that district in a day, it was computed by experts, this lady stated. It was impossible to leave windows open day or night. A constant bombardment of stones around the premises endangered lives, she said.

Mr. Clark stated that in his estimation the condition was like that of a war area in France. Noises from heavy trucks in the night and blasts dust and falling rocks in the day made the district hideous at all times.

Mr. Williamson stated that the chief interests of the city should be preservation of life, health and property. To carry out these duties the city should close down the quarries or limit them to certain areas. People ill in bed were situated less than 30 ft. from one quarry, it was claimed.

Proprietors stated that their holdings had seriously depreciated, their foundations were cracked, pictures and statuary were knocked from the walls, and their windows were smashed by blasting.

## West Virginia To Ask for Royalty on Ohio River Sand

ACCORDING to information from several newspapers, Attorney-General Howard B. Lee of West Virginia is contemplating filing civil suits against several sand and gravel companies operating in the Ohio river, to recover royalties, which in his opinion are due the state for the products removed from the bed of the stream. Mr. Lee is said to base his action on the proposition that the state owns all streams within its borders, including the Ohio river all the way across to the Ohio side. The announcement also states that he will go into the courts and ask for a restraining injunction against the operating companies. What court the proceedings will be started in has not yet been determined, but it was said at the attorney-general's office that it would be brought in the county where the individual companies operate.

The companies named by Mr. Lee as coming within the scope of his proposed action are: Pfaff and Smith, Builders Co., Charleston; West Virginia Sand and Gravel Co., Charleston; Sun Sand Co., Charleston; East Liverpool Sand Co., East Liverpool, Ohio; Wilson Sand and Supply Co., Huntington; Ohio River Gravel Co., Parkersburg; Western Rivers Co., Point Pleasant; Standard Sand and Gravel Co., Wheeling; Kanawha Sand Co., Parkersburg; Ohio Valley Sand Co., New Martinsville; Huntington Gravel and Supply Co., Huntington, and Keystone Sand and Supply Co., Pittsburgh.

Commenting on Mr. Lee's statement, the *Charleston* (W. Va.) *Mail* says:

"Although the Ohio river is a navigable stream and as such is controlled by the federal government in matters relating to navigation, the stream is owned by the state of West Virginia and the courts have so held. Ownership goes back to the time when the northwest territory boundary was specified as being 'all land lying northwest of the Ohio river.' Under this boundary description, the river itself remained a part of Virginia. When West Virginia became a separate state all rights in the stream formerly held by Virginia passed to it."

The *Huntington* (W. Va.) *Advertiser* says:

"We don't assume to know the legal questions involved in the attorney-general's proposed action, but we have an idea that they are numerous and quite complicated. First, it would have to be definitely settled that the state of West Virginia owned the bed of the river in a fee simple. And if ownership were sustained in a court ol law, somebody besides Mr. Lee would have to fix the rate of royalty and the amount due the commonwealth from the exploitation of the past.

"In fact, Mr. Lee himself admits that there is no law on the statute books prescribing a levy of royalties upon such enterprise. The logical procedure, it seems, would be for the legislature to take some action before Mr. Lee took it upon himself to engage the sand and gravel concerns in costly litigation.

"Putting aside the legal involvements for the time, we must admit that the sand and gravel concerns that extract their product from the bed of the river are a benefit rather than a detriment, to the public. Their operations keep the channel of the stream free from obstruction, thereby aiding navigation and saving the federal government hundreds of thousands of dollars annually on its dredging costs."

Heads of several companies involved have expressed themselves rather strongly on the matter, declaring that the issue is merely another means of raising taxes. They are planning, it is said, to take legal action to maintain their business free from further unnecessary taxation.

## Two Prominent German Lime Manufacturers on American Visit

TWO of the leading lime manufacturers of Germany are now in the United States on a seven weeks inspection tour, extending from coast to coast. The visitors are Paul Ludowigs, president of the Rheinische Kalksteinwerke; Kreis Mettman, Wuelfrath and Hellmuth Siemssen, general manager of

*Paul Ludowigs (left) and Hellmuth Siemssen*

the Rheinisch-Westfalische Kalkwerke, Dornap. The combined production of burnt lime from these two plants is close to 1,000,000 tons annually—probably the largest lime operations in the world and certainly larger than any operations in the United States. (These two plants will be described by Victor J. Azbe, lately returned from Europe, in later issues of ROCK PRODUCTS.)

## Huron Portland to Build Elevator on Waterfront

ACCORDING to Buffalo newspaper reports, the Huron Portland Cement Co. of Alpena, Mich., also operating large packing plants at Cleveland, Detroit, Chicago, Milwauke and Duluth, has let the contract for the immediate construction of a huge $1,000,000 cement elevator to be located on the Buffalo harbor front, between the Buffalo river and Ganson on the Hamburg turnpike.

It is expected that the plant, which will be about 250 ft. long, 150 ft. wide and rise 100 ft. into the city's sky line, will be completed, fully equipped and ready for operation when navigation reopens in the spring. It will have a storage capacity of 200,000 barrels of cement, with a daily output of 40,000 sacks.

With the cement brought to a finished state and made ready for use at the company's Alpena works, the local plant is to be used solely for storage in bulk, bagging and distribution of the product throughout western New York and Pennsylvania affording the company an adequate and immediate source of supply in that territory.

For this purpose the buildings will include 21 concrete silos each with a maximum storage capacity of about 10,000 bbl. They will be loaded during navigation by a fleet of four specially designed lake steamers owned and operated by the company and running between Buffalo and Alpena. Each of the boats has a carrying capacity of 40,000 bbl. and is equipped with special machinery for loading and unloading.

One of the reasons for such large storage room in the silos, it is understood, is to take full advantage of water transportation during the navigation season so that when the boats cease running each fall there will be on hand in Buffalo a stock of cement to meet all demands throughout the winter.

Of concrete construction throughout, the plant proper will be four stories high and designed to permit of expeditious distribution by both rail and motor transportation.

## Pacific Coast Rock and Gravel Company to Build Plant

THE Pacific Rock and Gravel Co., a recently organized concern of Centerville, Calif., is planning the erection of a gravel washing and screening plant, according to a report in the *Centerville* (Calif.) *News*. The company now controls 74 acres of gravel land near Centerville which it is preparing to operate on a large scale. Work on the new plant will be started immediately, and it is expected that the pit can be in operation early in 1928. It is reported that the daily output of the plant will be 1500 tons of sand and gravel. The new company was organized under the direction of Lee Trontz of Pleasanton, Calif.

# Foreign Abstracts and Patent Review

**Constitution of Portland Cement.** A very unsual treatment of this problem is given by Dr. H. Luftschitz. He urges the reader to divert his attention from mere numerical values and fix it on the underlying truths.

By a process of reasoning Dr. Luftschitz arrives at conclusions similar to those drawn by Dr. Kühl on the basis of his experimental evidence. He considers portland cement as a mixture of solid solutions of low-lime silicates and low-lime aluminates. He also believes in the presence of free lime. Jaenecke's formula for alite, $8CaO{\cdot}2SiO_2{\cdot}Al_2O_3$ contradicts the performance of a rotary kiln in his opinion. To reduce such highly calcareous mixes to a glassy homogeneous substance seems to be outside the range of possible reactions in a rotary kiln.

The quantitative molecular differences of low-lime silicates and aluminates are the causes of differences in cements due to their mutual saturation powers. Mono-aluminates and mono-silicates of lime are the basic compounds of all cements, with a few possible substitutions. Such properties as hardening and strength are proportional to a large extent to their degree of concentration. It is useless to try to establish a formula for portland cement determining its exact lime content either in the clinker or after the final set. This is possible only for the main constituents of portland cement. These constituents of the clinker approach the ideal formula of a glassy blast furnace slag, which is derived by the author.

The author's formula for alite is: $4CaO{\cdot}2SiO_2{\cdot}Al_2O_3$ and he prefers to write it as follows: $Al_2O_3{\cdot}CaO+2(CaO{\cdot}SiO_2)+CaO$. Cement thus consists of monocalcium aluminate and monocalcium silicate combined in the molecular ratio of 1:2 in an unstable "solid solution," for whose formation or complete saturation lime seems to be a requirement. The mono-compounds are present in the clinker in the form of a glass of unstable state resembling the constitution of kaolin.

These conclusions are drawn on the basis of the following:

1. Portland cement consists of limestone and argillaceous rock. Consequently, kaolin, the purest argillaceous substance, combined with purest limestone should yield an "ideal" portland cement. It is evident that the practical temperatures of our kilns are insufficient to make use of kaolin in cement production. Its variations, namely, the ferruginous kinds, are better adapted for this purpose, as their sintering occurs at 1400-1500 deg. C.

2. Nature has provided two glassy substances of great strength and simple composition, which are quartz ($SiO_2$) and corundum ($Al_2O_3$). These two acid substances combined with bases such as lime must produce the intermediate stages between unstable compounds (slags, cements) and stable solid compounds (porcelain, glass). It is the mutual presence of silica and alumina, in their anhydrous form, that seems to form the basis of the hydraulic properties of cements.

3. Nature has also provided a "solid solution" of quartz and corundum in the form of kaolin and its derivatives.

4. Natural portland cement rock is a mixture of limestone and argillaceous rock, i.e., a non-homogeneous mixture of limestone with a derivative of kaolin. The energy, required for the formation of an ideal glass, must be sufficient to produce the very difficult reaction between molecules of silica and alumina. The energy consumed by cement and slag is greater than that required in the ceramic industries, due particularly to greater fineness of the mass of the latter, although they make use of purer products.

As a result, the author considers portland cement made up of simple mono-compounds of lime with silica and alumina, but in a peculiar state, which he designates "kaolinized."

He derives the formula for portland cement starting out with Zulkowsky's (Chemische Industrie, p. 280, 1899) formula for kaolin:

$$\begin{array}{l} \qquad\qquad\qquad\quad OH \\ OH{-}SiO{-}O{-}Al \;\; | \\ \qquad\qquad\qquad\quad >O{=}Al_2O_3{\cdot}2SiO_2{\cdot}2H_2O \\ OH{-}SiO{-}O{-}Al \;\; | \\ \qquad\qquad\qquad\quad OH \end{array}$$

According to Luftschitz, portland cement (alite, portland cement slag) should be written as follows:

$$Al_2O_3{\cdot}CaO{\cdot}2\,(CaO{\cdot}SiO_2){\cdot}CaO = Al_2O_3{\cdot}2SiO_2{\cdot}4CaO$$

In the process of hardening, when water is added from the outside, it becomes:

(1) $Al_2O_3{\cdot}2(CaO{\cdot}SiO_2)+CaO+4H_2O$

(2) $Al_2O_3{\cdot}CaO2(CaO{\cdot}SiO_2){\cdot}CaO+4H_2O$

A portland cement would be the result of calcination of a mixture consisting of 25% monocalcium-aluminate (or alumina cement) with 50% monocalcium-silicate and 25% pure lime (calcined lime). The future will see more certainty as to what should be mixed to obtain portland cement as a result of further studies of mixtures of mono-compounds. —*Tonindustrie-Zeitung* (1927), **71**, 1272-75.

**Causes of Ring Formation in the Sintering Zone of Rotary Kilns.** Dr. Karl Biehl groups the causes as follows:

1. Raw materials.
2. Fuel.
3. Kiln.
4. Lining.

Samples of rings were obtained from three different plants. These differed greatly in shape, color and structure.

Sample A showed a considerable increase of the iron, alumina and silica contents with a strong decrease of the lime content. A certain increase of the $SO_3$ content was also noted. The cause of ring formation in this case is undoubtedly due to the admixture of the coal ash to the cement and the subsequent increase of fluxing materials.

Sample B shows a marked decrease of silica, iron, alumina and lime with a very pronounced increase in $SO_3$ and the formation of alkalis of the $SO_3$ group. Evidently the cause here differs from that for sample A. The presence of alkali sulfates determines the ring formation in this case.

Sample C, similar to A, shows increased contents of iron, alumina and silica and a decrease of lime. The $SO_3$ content is higher, but seems to be but of minor importance in determining the ring formation. Quite obviously the materials used in this case are responsible for the latter.

The following conclusions may be drawn with regard to obviating the undesirable ring formation:

The materials should be ground to sufficient fineness and should be uniform throughout and their chemical composition should be within definite limits. The silica modulus should also be kept within certain limits. Fluxing materials such as iron, alumina, sulfates and alkalis should not exceed one-half of the silica content, in accordance with practical evidence. Mixes with relatively low lime content sinter and fuse more readily. The materials should be changed continuously and uniformly.

The fuel should be of even quality and have the same properties. Pulverizing coal for rotary kilns is of utmost importance, as otherwise the ash separates from the air currents in the sintering zone and settles along the walls of the kiln. Coal with low sulfur content is of great advantage when the mix contains relatively high alkali quantities.

Low ash percentage of the coal invariably reduces the formation of rings. The acid or alkaline character of the ash is also of importance, as it may influence the fusibility of the clinker and last a good draft is a most important factor.—*Zement* (1927), 817-820.

**Determination of Sulfates in Portland Cement.** The German specifications for cement now in force require: "The magnesia content shall not be greater than 5%; the sulfuric anhydride content not greater than 2½% in ignited portland cement."

This specification is not exact, as it has frequently been interpreted to mean that a

previously ignited sample is to be tested for magnesia and sulfuric anhydride content. While the magnesia content shows no effect of previous ignition, the sulfuric anhydride content decreases considerably, depending upon the duration and intensity of ignition. Ignition results in the formation of sulfur trioxide from gypsum and the sulfur trioxide is further decomposed into sulfur dioxide and oxygen. The content of these reactions is determined by the temperature and by the laws of chemical equilibrium. The presence of sulfides in cement renders these reactions even more complicated, as the oxidation of the latter requires oxygen, thus upsetting the chemical equilibrium.

Tests were made at the laboratory in Karlsruhe following standard procedure using three different cements. Each one furnishes samples to be tested dry without previous ignition; to be tested upon being exposed to a blast for 10 minutes and, finally, those tested upon being exposed for 30 minutes.

The values in the table below represent the arithmetic average of two tests. The sulfuric anhydride content is expressed as per cent by weight of dry cement.

| Cement Sample No. | % $SO_3$ by weight of cement: Not ignited | Ignited 10 min. | In 30 min. | Loss on ignition, % $SO_3$: In 10 min. | In 30 min. |
|---|---|---|---|---|---|
| 1 | 1.439 | 1.403 | ........ | 0.036 | ........ |
| 2 | 1.577 | 1.520 | 1.430 | 0.057 | 0.147 |
| 3 | 1.468 | 1.419 | 1.276 | 0.049 | 0.192 |

*Zement* (1927), **33**, 701-2.

**Change of Time of Set of Portland Cement.** A standard portland cement may become quick-setting when exposed to the action of the sun for some time, even when packed in barrels or bags. If this change occurs at normal temperature, it is an indication that insufficient gypsum was added in its manufacture and this condition may be corrected by increasing the gypsum admixture within the prescribed limits. The presence of alkalis may also be the cause of a change to quick-setting properties. Great care should, therefore, be exercised whenever the argillaceous constituent of the mix has a high alkaline content. A high alumina content is also detrimental to the set. High alumina cements are characterized by quick set and may develop a change in their setting properties, particularly when a high alumina content is coincident with a high content of alkalis.

The danger of portland cement becoming quick-setting may be counteracted by increasing those constituents of cement, which are known to impart to its slow-setting properties, such as silica and, particularly, iron oxide. As the silica content is limited for various reasons, iron oxide appears the logical constituent to be used as a means of combating the occurrence of changes of time of set of portland cement.—*Zement* (1927), **46**, 845.

**Effect of Sulphates on Mortars Made with Different Cements.** Tests were made of 1:3 plastic mortar specimens, 10 cm. long and 2 cm. on the side using fused cement, Holderbank, portland and slag cement. The sulphates were added in quantities of 5% by weight of sand. Potassium, calcium, magnesium, sodium, ferrous and ferric sulphates were used. Specimens were cured in moist air and observations made at ages of six months and one year.

The result of the observations led to the conclusion that the potassium, calcium and magnesium sulphates had the most detrimental effect.

The detrimental effect of these sulphates varies as their $SO_3$ content, which is respectively 46%, 47% and 32.6%. Although ferric sulphate has an $SO_3$ content of 43%, it appears inactive, permitting the conclusion that the nature of the base has some effect.

In practice, only the slag and portland cements are attacked by these sulphates. Holderbank and fused cements remain intact. It seems that the resistance to sulphates is a function of initial strength, rather than of the chemical composition of the cement.—*Le Ciment* (1927), 343-344.

**Clinker Cement.** The German periodicals *Zement* and *Tonindustrie-Zeitung* have issued special numbers devoted to the celebration of the 50th anniversary of the German Association of Portland Cement Manufacturers. Both contain articles on the present status of clinker research—which are radically different. While Janecke (*Tonindustrie-Zeitung*) maintains the existence of the Janeckeite, discovered by him and identical with Törnebohm's alite, whose formula he gives as $8CaO{\cdot}2SiO_2{\cdot}Al_2O_3$, Dyckerhoff (*Zement*) attributes the hydraulic properties of cement to calcium silicates, stating that tricalcium aluminate does not exist in portland cement clinker and that alumina occurs in ternary compounds of lime-silica-alumina making up the minor constituents of the clinker.

An impartial review of the statements brings forth the conviction that Dyckerhoff's careful conclusions take account of all of the material collected thus far, while Janecke, though referring to the work of his countrymen, neglects all investigations made abroad and particularly in Germany, where Nacken and Dyckerhoff have done important work in this connection.

Janecke first advanced his theory in 1912. He refers to it as an established theory, while there was never a time when it was not objected to by such scientists as Heyn and Wetzel in Germany and Rankin and Wright in the United States.

In 1914 the author (Dr. Hans Kühl) published an article in which he proved that samples of the composition of Janeckeite possess properties different from those of a good portland cement and cannot be the main constituent of cement, identical with alite, for this reason. Janecke's formula contradicts the evidence of low-alumina cements with 4-5% alumina, which are known to have the highest content of alite.

On the other hand, Dyckerhoff's claim that bicalcium silicate is alite seems unjustified, as the author knows that even large lumps of clinker deteriorate due to bicalcium silicate. Dyckerhoff's proposition that alite be designated as bicalcium silicate and belite as tricalcium silicate seems unfounded at this date.

The author is inclined to believe that alite is a solid solution of a highly basic calcium silicate and a highly basic calcium aluminate with possible lime in solution. This statement was first made by him in 1914.—*Zement* (1927), **37**, 869-871.

**Puzzolana Cement.** The Italian engineer F. Ferrari has observed the following:

1. The rate of hydration of quicklime and its ability to expand are greatly reduced by the presence of gypsum. This reduction is proportional to the quantity of gypsum intimately mixed with the lime.
2. The calcium hydrate which is produced in the presence of gypsum is favorable to adherence.
3. Natural or artificial puzzolans (puzzolans proper, trass, scoria, calcined clay, etc.) are able to fix in the presence of lime large quantities of calcium sulphate, these quantities being proportional to the alumina content of the puzzolans.

On the basis of the foregoing, it occurred to him to change the usual practice of preparation of puzzolan cements by substituting a composite cement, made from lime, gypsum and puzzolans.

The danger of excessive expansion is thus eliminated; the cement hydrates slowly and possesses exceptionally good adherence. Mortars made with this cement have given better results than ordinary lime mortars.

The puzzolans were selected from the best native puzzolans of Italy. The lime had the following composition: $SiO_2$....1.29%; $Al_2O_3$....1.29%; $Fe_2O_3$....0.95%; CaO....92.80%; MgO....0.75%; alkalis, etc.....0.61%. The gypsum was an ordinary natural product. The mixing proportions depended on the materials used, the activity of the puzzolans, the basicity of the lime scoria and on the $SO_3$ content of gypsum. The proportions used were: Puzzolan, 84%; lime, 12%; gypsum, 4%.

The product left a residue of 10.7% on the 4900-mesh sieve. The initial set took place after 1 h. 20 min.; the final set after 3 hr. The expansion (LeChatelier) was nil.

At the age of 28 days the mortar (standard 1:3) had a tensile strength of 24 kg. and a compressive strength of 239 kg. After 2-year immersion in fresh water these figures became respectively 38 and 402 kg.

This cement is superior to the hydraulic limes, generally composed of hydrated lime and puzzolans, and belongs decidedly in the class of slow-setting cements having the advantages of reduced basicity, perfect watertightness of the mortar, absolute resistance to sea water, etc. It can thus compete with all kinds of hydraulic limes and portland cements.—*Rev. des. Mat. de Const.* (1927), 276-277.

# Traffic and Transportation

EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.


## Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts), as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

| District | Limestone Flux Week ended Sept. 24 | Limestone Flux Week ended Oct. 1 | Sand, Stone and Gravel Week ended Sept. 24 | Sand, Stone and Gravel Week ended Oct. 1 |
|---|---|---|---|---|
| Eastern | 3,876 | 3,402 | 18,030 | 17,071 |
| Allegheny | 3,996 | 4,224 | 11,932 | 12,447 |
| Pocahontas | 547 | 544 | 1,387 | 1,359 |
| Southern | 773 | 566 | 13,031 | 12,962 |
| Northwestern | 950 | 1,321 | 10,278 | 7,301 |
| Central western | 569 | 551 | 12,175 | 10,513 |
| Southwestern | 437 | 429 | 7,742 | 7,354 |
| Total | 11,148 | 11,047 | 74,575 | 69,007 |

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1926 AND 1927

| District | Limestone Flux 1926 Period to Date Oct. 2 | Limestone Flux 1927 Period to Date Oct. 1 | Sand, Gravel and Stone 1926 Period to Date Oct. 2 | Sand, Gravel and Stone 1927 Period to Date Oct. 1 |
|---|---|---|---|---|
| Eastern | 133,783 | 135,245 | 396,283 | 403,044 |
| Allegheny | 151,973 | 141,712 | 293,406 | 300,394 |
| Pocahontas | 20,616 | 20,327 | 34,253 | 36,187 |
| Southern | 26,200 | 23,066 | 479,270 | 478,011 |
| Northwestern | 56,525 | 53,801 | 250,842 | 256,265 |
| Central western | 19,810 | 20,033 | 355,153 | 361,963 |
| Southwestern | 11,603 | 13,527 | 204,061 | 213,748 |
| Total | 420,510 | 407,711 | 2,013,268 | 2,049,612 |

COMPARATIVE TOTAL LOADINGS 1926 AND 1927

| | ***1926*** | ***1927*** |
|---|---|---|
| ***Limestone flux*** | ***420,510*** | ***407,711*** |
| ***Sand, stone, gravel*** | ***2,013,268*** | ***2,049,612*** |

## Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning October 22:

### SOUTHWESTERN FREIGHT BUREAU DOCKET

13417. **Crushed stone**, from points in Louisiana to points in Texas. To amend Item 3475 of S. W. L. Tariff 21-S applying on crushed stone, carloads, from stations in Louisiana by adding the following stations as points of destination: B. S. L. & W. stations, Grayburg to Elizabeth, Texas, and Hunting Bayou to Goose Creek, Texas, inclusive. Scale now applies to B. S. L. & W. stations, Houston to Sour Lake (10-210) and it is desired to establish same scale to intermediate points and to points on newly constructed line.

13424. **Sand and gravel**, from points in Texas and Arkansas to points in Arizona, **Louisiana and** Texas. To amend Item 11368B of S. W. L. Tariff 1P; Item 6122B, S. W. L. Tariff 8G; Item 5004, S. W. L. Tariff 20H, applying from points in Texas and Arkansas to points in Arkansas, Louisiana and Texas by changing the commodity description to read, "Sand and gravel, straight or mixed carloads." The proposed change in the commodity description is necessary because the gravel pits at points of origin named secure their gravel through a washing process and there is left large quantities of sand, the market for which is the same market that takes the gravel. On the present basis the producers are not able to ship sand in straight or in mixed carloads with gravel because the only rating provided for is Class E, which is prohibitive. For example, Class E from Louisville, Ark., to Texas common points is 47½c per 100 lb.

### WESTERN TRUNK LINE DOCKET

496-I. Rates: **Limestone, agricultural, ground or pulverized**, in bags, barrels or in bulk, for soil treatment, carloads (See Note B), from Louisville, Neb., to stations on the C. B. & Q. in Iowa. Present—Crushed stone rates. Proposed—Iowa intrastate single line rates shown in Iowa Lines' Tariff 160-E, issued by E. B. Boyd.

**Note A—Minimum weight marked capacity of car.**

**Note B—Minimum weight 90% of marked capacity of car.**

**Note C—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.**

1376 S. Rate: **Sand, silica**, pumice and ash, volcanic, carloads, minimum weight marked capacity of car, but not less than 60,000 lb., except where car of less capacity is furnished at carriers' convenience the marked capacity of car will apply, from various points in Kansas to Chicago, Peoria, St. Louis, St. Paul, Cairo, Memphis and additional Illinois points. Present and proposed rates to a few representative points are as follows:

From Beardsley, Kan.; Dellvale, Kan.; Hoxie, Kan.; Speed City, Kan.; Burr Oak, Kan.

| To— | Present | Proposed |
|---|---|---|
| St. Louis, Mo., group | (a) 22 | 17 |
| Peoria, Ill., group | (a) 24 | 20 |
| Chicago, Ill., group | (a) 24 | 20 |
| St. Paul, Minn., group | (b) 24 | 24 |
| Memphis, Tenn., group | Class | 21 |
| Cairo, Ill. | C. & C. rates | 18 |
| Lawrenceville, Ill. | C. & C. rates | 18 |
| Mt. Vernon, Ill. | C. & C. rates | 18 |
| Carbondale, Ill. | C. & C. rates | 18 |
| Sandusky, Ill. | C. & C. rates | 18 |
| Shawneetown, Ill. | C. & C. rates | 18 |

(a) Applies only from Hoxie, Speed City and Burr Oak, Kan. From other points class rates apply.

(b) Applies only from Hoxie, Kan. From other points class rates apply.

From Anthony, Kan.; Fowler, Kan.; Kanapolis, Kan.; Kismet, Kan.; Meade, Kan.; Mt. Zion, Kan.; Quinter, Kan; Satanta, Kan.; Ulysses, Kan.; Wilmore, Kan.

| To— | Present | Proposed |
|---|---|---|
| St. Louis, Mo., group | (c) 22 | 17 |
| Peoria, Ill., group | (d) 24 | 20 |
| Chicago, Ill., group | (d) 24 | 20 |
| St. Paul, Minn., group | (e) 24 | 24 |
| Memphis, Tenn., group | (f) 29 | 20 |
| Cairo, Ill. | (f) 29 | 17 |
| Lawrenceville, Ill. | C. & C. rates | 17 |
| Mt. Vernon, Ill. | C. & C. rates | 17 |
| Carbondale, Ill. | C. & C. rates | 17 |
| Sandusky, Ill. | C. & C. rates | 17 |
| Shawneetown, Ill. | C. & C. rates | 17 |

(c) Applies only from Anthony, Kismet, Meade, Quinter and Satanta, Kan. From all other points class rates apply.

(d) Same as (c) except no through rates prevail from Wilmore, Kan. From all other points and Wilmore, Kan., class rates.

(e) Applies only from Anthony, Meade and Quinter, Kan. From all other points class rates apply.

(f) Applies only from Satanta, Kan. From all other points class rates apply.

2051-D-D. Rates: **Stone, crushed**, carloads. Usual minimum to apply. From Dell Rapids, S. D.

| To | Present | Proposed |
|---|---|---|
| Winside, Neb. | 9½c | 9c |
| Wayne, Neb. | 9½c | 9c |
| Wausa, Neb. | (combination basis) | 10½c |
| Laurel, Neb. | (combination basis) | 12c |
| Pender, Neb. | 9c | 8½c |
| Tilden, Neb. | 11½c | 11c |

16496. **Limestone, ground or pulverized**, and **limestone dust**, carloads, minimum weight 50,000 lb., from Jamesville, N. Y., to Scranton, Penn., $1.51 per ton of 2000 lb. Reason—Proposed rate is comparable with rate now in effect from Cobleskill, N. Y., to Scranton, Penn., as per D. L. & W. I. C. C. 13449.

16512. **Agricultural lime**, carloads, from Avis, Penn., to Flemingville, Newark Valley, Berkshire, Richford, Burdett, N. Y., and Wyalusing, Penn., 16½c per 100 lb. Reason—Proposed rate compares favorably with rates now in force on like commodity from Avis and Bellefonte, Penn., to Owego and Binghampton, N. Y., as per P. R. R. G. O. I. C. C. 14461.

16519. (A) **Common sand**; (B) **Sand, blast, engine, glass, molding, quartz, silica, silex, flint, ground, *rock ganister**, carloads, minimum weight 90% of marked capacity of car, from Cumberland, Md., and Berkeley Springs District, W. Va., to B. & O. R. R. points in West Virginia; Mendota, St. Marys, Parkersburg, Proctor, New Martinsville and various, (A) $2.10 per ton of 2000 lb., (B) 10½c per 100 lb.

*From Berkeley Springs only.

Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

16522. **Sand**, blast, core, engine, filter, fiber or furnace, foundry, glass, grinding or polishing, loam, molding and silica, carloads, minimum weight 90% of marked capacity of car, from Falconer, Moons and Kennedy, N. Y., to Lancaster and North Tonawanda, N. Y., $1.10; Lockport, N. Y., and Niagara Falls, N. Y., $1.20 per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities to Buffalo and Depew, N. Y., and other points in the same territory.

16526. **Ground limestone**, carloads, minimum weight 50,000 lb., from Bellefonte and Pleasant Gap, Penn., to Elm Grove, W. Va., 12½c per 100 lb. Reason—To establish rate which will be comparable with rate in force from Martinsburg, W. Va., to same point of destination, as per Agent Curlett's I. C. C. A193.

16527. (A) **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads; (B) **sand**, blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, minimum weight 90% of marked capacity of car, from South Jersey sand shipping points to Ramapo, N. Y., (A) $2.42, (B) $2.60 per ton of 2000 lb. Reason—To place the rates on a comparable basis with rates on West Mahwah, N. J., as per P. R. R. G. O. I. C. C. 13800.

1376T. **Sand, silica**, pumice, ash, volcanic, carloads (See Note A), but not less than 60,000 lb., except when car of less than 60,000 lb. capacity is furnished at carriers' convenience, marked capacity of car will apply. From Wilmore, Kan., to the following points:

| To— | Present | Proposed |
|---|---|---|
| Salina, Kan. | 24½ | 15½ |
| Topeka, Kan. | 23 | 14½ |
| Wichita, Kan. | 15½ | 9½ |
| Winfield, Kan. | 15½ | 10 |
| Ft. Scott, Kan. | 25½ | 14½ |
| Pittsburg, Kan. | 24½ | 14½ |
| Lincoln, Neb. | 33½ | 19 |
| Omaha, Neb. | 33½ | 19 |

### NEW ENGLAND FREIGHT ASSOCIATION DOCKET

13177. **Sand, building, common or run of bank**, carloads (See Note B), from Auburn, Mass., to stations on the N. Y. N. H. & H. R. R., mileage basis of rates proposed same as shown on page 394 of N. Y. N. H. & H. R. R. Tariff I. C. C. F2795, except where there are now effective specific commodity rates from Auburn, Mass., on this traffic. Reason—To equalize competitive conditions.

13202. **Molding sand**, carloads (See Note C), from Elnora, Reynolds, Schagticoke, Schuylerville, Scotia, Saratoga Springs, Stillwater, Way-

ville, Ushers, N. Y., to Bayonne, Bayway, Bound Brook, Carteret, Elizabeth, Garwood, Jersey City, Lincoln, Newark, Perth Amboy and Raritan, N. J., 16c, via Mechanicsville, N. Y., D. & H. Co., Wilkes-Barre, Penn., C. R. R. of N. J. and to Harrison, New Brunswick, Waverly, N. J., 16c, via Mechanicsville, N. Y., D. & H. Co., Wilkes-Barre, Penn., P. R. R. Reason—To establish same commodity rate as now in effect to stations located in contiguous territory.

### TRUNK LINE ASSOCIATION DOCKET

16562. Sand (other than blast, engine, foundry, glass, molding or silica) **and gravel**, carloads, from Dorsey, Md., to Hyattsville, Brentwood, Md., Langdon and Washington, D. C., 70c per ton of 2000 lb. Reason—Proposed rates compare favorably with present rates from Dorsey, Md., to Baltimore, Md., also with rates from Georgetown, D. C., to same points of destination named above as per B. & O. I. C. C. 20836.

16578. (A) **Sand**, other than blast, engine, foundry, glass, molding or filter, carloads; (B) **Sand, blast, engine, foundry, glass, molding or filter**, carloads (See Note B), from Cape May, N. J., to Richwood, W. Va. (A) $5.20 and (B) $5.50 per ton of 2000 lb. Reason—Proposed rates are based over existing commodity rates from Cape May, N. J., to Clarksburg, W. Va., as per P. R. R. G. O. I. C. C. 14287, this being the difference in the 6th class rates, Cape May, N. J., to Richwood, W. Va., versus Cape May, N. J., to Clarksburg, W. Va., as per P. R. R. G. O. I. C. C. No. 13276.

16583. **Limestone screenings**, carloads (See Note B) from Atlas, Hamburg and Lime Crest, N. J., to Nazareth, Penn., $1.50 per ton of 2000 lb. Reason—Proposed rate compares favorably with rates on limestone, ground, precipitated or pulverized, and limestone dust, as per L. & H. R. Ry. I. C. C. No. A1747.

16587. (A) **Agricultural or land lime**, carloads, minimum weight 30,000 lb.; (B) **Ground limestone**, carloads, minimum weight 50,000 lb.

From Pleasant Gap, Penn.

| To— | Proposed rates (A) | (B) |
|---|---|---|
| Oliver, Penn. | .... | 11 |
| Fairchance, Penn. | .... | 11 |
| Mt. Pleasant, Penn. | 12 | 11 |
| Connellsville, Penn. | .... | 11 |
| Morgantown, W. Va. | .... | 11 |

From Bellefonte and Pleasant Gap, Penn.

| To— | Proposed rates (A) | (B) |
|---|---|---|
| Marienville, Penn. | 14½ | *305 |

*In cents per 2000 lb., other rates in cents per 100 lb.

Reason—To establish rates which will be comparable with rates now in force to same points of destination, from Martinsburg, W. Va., as per B. & O. R. R. I. C. C. 14287, and Agent Curlett's I. C. C. A193.

16588. **Crushed stone**, carloads (See Note B), from Morrisville, Penn.

| To— | Proposed rate |
|---|---|
| Delmar, Del., to Loretto, Md. | 175 |
| Princess Anne, Md., to Green Bush, Va. | 185 |
| Tasley to Melfa, Va. | 195 |
| Keller, Va. | 220 |
| Painter to Jarvis Siding, Va. | 230 |
| Cobbs to Cape Charles, Va. | 240 |
| Old Point Comfort to Portsmouth, Va. | 265 |

Proposed rates in cents per 2000 lb.

Reason—Proposed rates for distances up to and including 220 miles are based on the scale prescribed by the Interstate Commerce Commission's Order in Cases 9389 and 9532. Proposed rates for distances exceeding 220 miles are based on the rates now in effect from Stony Brook, Penn., as per P. R. R. G. O. I. C. C. 13558.

16589. To restrict the rates on **limestone**, viz., crude, crushed, crude fluxing, crushed fluxing, fluxing, foundry and furnace, as published in various Pennsylvania tariffs and Agent Curlett's I. C. C. A193, to various points in Trunk Line, New England and C. F. A. territory, so as to apply only when shipped in open top equipment, and at the same time provide for the application of the ground limestone rates when such commodities are shipped in box cars. Except when the rate on ground limestone is the same as or lower than published on limestone, viz., crude, crushed, crude fluxing, crushed fluxing, foundry and furnace.

16593. **Sand**, carloads (See Note B), from Berkeley Springs, Hancock, Great Capacon, W. Va., and Cumberland, Md., to Ravenswood, W. Va., as follows:

| Commodity— | Prop. rate |
|---|---|
| Sand, common | 12 |
| Sand, molding | 13 |
| Sand, blast, engine, glass, quartz, silica and silex | 13 |

Rates in cents per 100 lb. Reason—Proposed rates are the same as published to Huntington and Kenova, W. Va., as per Agent Wilson's I. C. C. A157.

16610. **Sand**, other than blast, engine, foundry, glass, silica or molding **and gravel, in carloads** (See Note B), from Oaks Corners, N. Y., to the following New York points:

| | *Prop. Rates | | *Prop. Rates |
|---|---|---|---|
| Carlton | $1.10 | Appleton | 1.30 |
| Waterport | 1.10 | Coomer | 1.30 |
| Ashwood | 1.20 | Wilson | 1.30 |
| Lyndonville | 1.20 | Elberta | 1.30 |
| Millers | 1.20 | Ransomville | 1.30 |
| Burt | 1.30 | | |

*Per ton of 2000 lb.

Reason—Proposed rates compare favorably with rates on like commodities from and to points in the same general territory as per N. Y. C. R. R. I. C. C. N. Y. C. 15406.

16479, Sup. 1. **Sand, blast, engine, foundry, molding, ground, flint, quartz, silex or brick sand**, carloads (See Note B), from Berkeley Springs-Hancock District to Bridgeburg and Reesedale, Penn., $2.16 per ton of 2000 lb.

16408. **Stone, crushed** or quarry broken, carloads, minimum weight 90% of marked capacity of car, from Jamesville and Rock Cut (Syracuse), N. Y., to Elmsford, N. Y., $2.60 per ton of 2000 lb. Reason—Proposed rate is comparable with rate from Little Falls, N. Y., as per N. Y. C. R. R. I. C. C. N. Y. C. 15402.

16419. (A) **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads; (B) **sand, blast, engine, foundry, molding, glass, silica, quartz or silex**, carloads, minimum weight 90% of marked capacity of car, from Burnham, Penn., and Lewistown, Penn., to St. Clair, Penn. (A) $2.40 and (B) $2.61 per ton of 2000 lb. Reason—To establish rates which will be comparable with those in force between points in the same general territory as per P. R. R. G. O.-I. C. C. Tariffs 14553 and 14194.

### SOUTHERN FREIGHT ASSOCIATION DOCKET

36527. **Sand and gravel**, from Montgomery, Ala., to Lamont, Fla. Present rate, 213c. Proposed rate on sand and gravel, in straight or mixed carloads (See Note C). Not subject to Agent Jones' combination tariff, from Montgomery, Ala., to Lamont, Fla., 190c per net ton.

36555. **Sand, molding**, from Leedy, Miss., to southeastern destinations. It is proposed to establish the following reduced rates on sand, molding (See Note C), from Leedy, Miss. To Anniston, Gadsden and Talladega, Ala., 169c; Sheffield, Ala., 150c; Atlanta, Columbus and Rome, Ga., 195c; Chattanooga, Tenn., 150c; Cleveland, Tenn., 170c; Knoxville, Lenoir City and Nashville, Tenn., 200c per net ton. Proposed rates are made in line with rates from Red Bay and other shipping points.

36560. **Sand and gravel**, from Cairo, Ill. (proper) to M. & O. R. R. stations. It is proposed to reduce the present rates on sand and gravel, carloads, from Cairo, Ill. (proper), to stations on the M. & O. R. R., Kenton, Tenn., to Guy's, Tenn., inclusive (except Fruitland, Tenn.) to be no higher than the rates in effect from Elco and Gravel Pit, Ill.

36645. **Crushed stone**, from Blue Ridge, Rostoco, Alco, Miles, Pembroke and Ripplemead, Va., and slag from Roanoke and Pulaski, Va., to Inlet and Ocean Park, Va. It is proposed to establish rate of 175c per net ton on slag, carloads, minimum weight 100,000 lb., from Roanoke and Pulaski, Vt., and on crushed stone, carloads, minimum weight 100,000 lb., from Blue Ridge, Rostoco, Alco, Miles, Pembroke and Ripplemead, Va., to Inlet and Ocean Park, Va., the same as suggested under Submittal No. 35618, from C. & O. shipping points to the same destinations.

36672. **Crushed stone**, etc., from Tate and Whitestone, Ga., to Natchez, Miss. (for beyond). It is proposed to establish proportional rate of 215c per net ton on crushed stone, rubblestone and broken stone, in straight or mixed carloads (See Note C), from Tate and Whitestone, Ga., to Natchez, Miss. (for beyond, when destined to points in Arkansas, Louisiana and Texas). Proposed in order to permit lines through Natchez, Miss., to participate in this traffic on same basis as lines through Vicksburg, Miss.

36684. **Agricultural stone**, from Frankfort, Ky., to L. & N. R. R. Kentucky stations. It is proposed to establish the following reduced rates on **stone, agricultural (ground or pulverized limestone), carloads, minimum weight 60,000 lb., from** Frankfort, Ky.: To Benson, Ky., 54c; Hatton, Ky., 63c; Bagdad, Christiansburg and Cropper, Ky., 72c; Pleasureville, Hill Spring and Eminence, Ky., 81c per net ton—made on basis recently employed quite extensively in establishing rates on this commodity between points on the L. & N. R. R.

36696. **Crushed stone**, from Gantt's Quarry, Ala., to Vicksburg, Miss. Combination now applies. Proposed rate on stone, crushed, carloads (See Note C), from Gantt's Quarry, Ala., to Vicksburg, Miss., 12½c per 100 lb., same as rate in effect on crushed marble.

### CENTRAL FREIGHT ASSOCIATION DOCKET

16741. To establish on **sand and gravel**, carloads, Lafayette and Kern, Ind., to Gary, Ind. Present and proposed rates, in cents per net ton, to Gary, Ind.: Present rates—105c, N. Y. C. R. R. delivery; 113c, M. C. R. R. delivery. Proposed rates—75c, N. Y. C. R. R. delivery; 95c, M. C. R. R. delivery.

16746. To establish on **sand**, viz.: Blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica, carloads, Falconer, Moons and Kennedy, N. Y., to New York. Present and proposed rates, in cents per net ton:

| To— | Prop. rate | Pres. rate |
|---|---|---|
| Lancaster, N. Y. | 110 | 126 |
| Lockport, N. Y. | 120 | 139 |
| Niagara Falls, N. Y. | 120 | 126 |
| North Tonawanda, N. Y. | 110 | 126 |

16748. To establish on **sand**, blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, carloads, River Valley, Penn., to Sharpsville and Sharon, Penn., and Hubbard, Ohio. Present and proposed rates:

Rates in cents per 2000 lb.

| | Proposed rate | | Present rate |
|---|---|---|---|
| Sharpsville, Penn. | 126 | (1) | 139 |
| Sharon, Penn. | 126 | (1) | 139 |
| Hubbard, Ohio | 126 | (1) | 139 |

(1) B. & L. E. R. R. I. C. C. 860.

Routing via Shenango, Penn., and Erie R. R.

16763. To establish on **crushed stone**, carloads, Spore, Ohio, to stations on the western division and the St. Marys branch of the N. Y. C. R. R. (O. C. L.) in Ohio following rates:

| To— | Prop. rate |
|---|---|
| Western Division— | |
| Lime City | 95 |
| Dowling to Mermill | 100 |
| Cygnet to Mortimer | 105 |
| Findlay to Dunkirk | 115 |
| Blanchard to Ridgeway | 125 |
| West Mansfield | 135 |
| Lunda to Kile | 125 |
| Amlin | 115 |
| St. Marys Branch— | |
| East Liberty to Lewistown | 135 |
| Russell's Point to Moulton | 145 |
| St. Marys | 155 |

Present rates—Sixth class.

16770. To establish on **stone dust**, carloads, Kenova, W. Va., to Cincinnati, Ohio, rate of $1.66 per net ton, and to Columbus, Ohio, $1.36 per net ton. Present rates—To Columbus, $1.80 per net ton, and to Cincinnati, Ohio, $3.60 per net ton.

16779. To establish on **sand and gravel (all kinds)**, carloads, Mogadore, Ohio, to various points in Ohio, rates as shown. Present rates—As published in W. & L. E. Ry. Freight Tariff No. 10C, Ohio No. 1078 and C. F. A. T. B. Tariff 230-A. I. C. C. No. 1938.

From Mogadore, Ohio
(Rates in cents per net ton)

| To— | Miles | Pro. rate | | Miles | Pro. rate |
|---|---|---|---|---|---|
| W. & L. E. Railway | | | | | |
| Kent | 8 | 60 | Lodi | 71 | 80 |
| Twinsburg | 20 | 60 | Spencer | 78 | 80 |
| Bedford | 28 | 70 | Wellington | 77 | 80 |
| Canton | 20 | 60 | S. Lorain | 110 | 80 |
| Justus | 35 | 75 | E. Canton | 25 | 65 |
| Bolivar | 41 | 80 | Robertsville | 31 | 75 |
| Zoar | 46 | 85 | Minerva | 39 | 80 |
| Valley Jct. | 48 | 85 | Onida | 37 | 80 |
| Somerdale | 50 | 85 | Carrollton | 47 | 85 |
| Orrville | 49 | 80 | Sherrodsville | 59 | 90 |
| Smithville | 55 | 80 | Chagrin Falls | 32 | 75 |
| Creston | 63 | 80 | | | |
| Northern Ohio (Via Spencer) | | | | | |
| Medina | | | | 94 | 85 |
| Erie (Via Kent) | | | | | |
| Sterling | 41 | 80 | Niles | 44 | 80 |
| Rittman | 37 | 80 | Girard | 48 | 85 |
| Wadsworth | 32 | 75 | Youngstown | 52 | 85 |
| Barberton | 26 | 70 | Hubbard | 60 | 90 |
| Akron | 18 | 70 | Phalanx | 39 | 80 |
| Ravenna | 14 | 70 | Mantua | 54 | 85 |
| Braceville | 31 | 75 | Aurora | 61 | 90 |
| Leavittsburg | 35 | 75 | Leetonia | 66 | 95 |
| Warren | 38 | 80 | Lisbon | 77 | 100 |
| C. C. C. & St. L. Ry. (Via Cleveland) | | | | | |
| Berea | 53 | 80 | Grafton | 65 | 90 |
| N. Y. C. & St. L. R. R. (Via Cleveland) | | | | | |
| Rocky River | 48.6 | 80 | South Lorain | 64.9 | 90 |
| Avon | 58.2 | 80 | | | |
| Baltimore and Ohio R. R. (Via Kent) | | | | | |
| Sterling | 46 | 80 | Leavittsburg | 35 | 75 |
| Rittman | 41 | 75 | Warren | 38 | 80 |
| Clinton | 34 | 75 | Niles | 43 | 80 |
| Barberton | 28 | 70 | Girard | 48 | 85 |
| Akron | 20 | 70 | Youngstown | 49 | 85 |
| Cuyahoga F'ls | 13 | 70 | Lowellville | 57 | 90 |
| Ravenna | 15 | 70 | Middlefield | 67 | 95 |
| Newton Falls | 30 | 70 | Chardon | 80 | 100 |
| (Via Justus) | | | | | |
| Canal Fulton | 52 | 80 | Grafton | 93 | 90 |
| Sterling | 67 | 80 | Elyria | 99 | 90 |
| Medina | 79 | 85 | Lorain | 108 | 90 |
| Lester | 84 | 85 | Berea | 98 | 90 |

New York Central R. R.
(Via Minerva)

| | | | | | |
|---|---|---|---|---|---|
| Paris | 45 | 80 | Wattsville | 53.6 | 85 |
| Alliance | 55.3 | 80 | Bergholz | 58.5 | 90 |
| Augusta | 44 | 80 | Amsterdam | 62.6 | 90 |
| Mecnanicsto'n | 50.1 | 85 | | | |

Pennsylvania R. R.
(Via Canton)

| | | | | | |
|---|---|---|---|---|---|
| Alliance | 38 | 80 | Lowellville | 83.4 | 100 |
| Beloit | 43.6 | 90 | Warren | 71 | 80 |
| Salem | 51.8 | 90 | Ravenna | 56.4 | 80 |
| Leetonia | 58.2 | 90 | Clinton | 41.5 | 80 |
| Snodes | 44.7 | 80 | Barberton | 47.8 | 85 |
| Niles | 65.9 | 80 | Akron | 55.2 | 85 |
| Girard | 70.4 | 95 | Cuyagoha F'ls | 60.2 | 90 |
| Youngstown | 75.3 | 95 | Hudson | 68 | 80 |
| Struthers | 80.4 | 90 | | | |

16829. To establish on **sand and gravel**, carloads, Cannelton, Evansville, Rockport, Tell City and Troy, Ind., to Council Bluffs, Iowa, and Omaha, Neb., commodity rate of 381c per net ton. Present rate: From Evansville, Ind., to Council Bluffs, Iowa, and Omaha, Neb. Class E rate of 25c.

16835. To establish on **crushed stone**, carloads, from Blanchard, Ohio, to Larue, Ohio, rate of 75c per net ton. Present rate: 80c per net ton.

## Recent I. C. C. Decisions

**19381.** Sand and gravel rates from Sargent, Ohio, to Welch, W. Va., on shipments in 1925 and 1926 unreasonable and reparation awarded on a basis of 81.76 per net ton.

**I. and S. 2986.** Schedules suspended from October 3, 1927, to May 3, 1928. The suspended schedules propose to reduce the rates on plaster, carloads, from Gerlach, Nev., to destinations in southern California.

The Florida Railroad Commission has denied an application of the Seaboard Air Line railroad for a reduction of rates on cement in carloads from Tampa to east coast stations, it was announced here.

The railroad applied for permission to reduce its rates on the ground that such reduction was necessary to meet competition. After an investigation, however, the commission, it was stated, held that because of the fact that the existing rates were already much lower than the interstate rate, no justification could be seen in a further reduction.

The hearing on the complaint of the Saluda Crushed Stone Co. against all the railroads of South Carolina, in which the stone dealers complained that the rates were unjust and prejudicial, was held in the offices of the railroad commission and the case taken under advisement for a later decision by the commission.

The complainants alleged that the rates on crushed stone from Hellums to other South Carolina points were higher than those charged for other quarries for the same mileage. The commission desires to extend the scope of the case to apply to sand and gravel also, as the rates on these are on the same basis. Therefore it issued an order for investigation.

**I. and S. 2984.** Operation of certain schedules published as I. C. C. No. A-606 suspended from October 1, 1927, to May 1, 1928. The suspended schedules propose to increase the rates on stone, crushed or ground, from Calera, Ala., to New Orleans and Baton Rouge, La., also the rates on stone and slag from Birmingham, Ala., and group, to New Orleans and Baton Rouge, La., via the Louisville and Nashville railroad and its connections.

**18827. Sand rate of 12 cents from Pacific, Mo., to Fort Smith, Ark., inapplicable** and unreasonable over the St. Louis-San Francisco but reasonable and applicable over the Missouri Pacific. Refund ordered on shipments to basis of 11.5 cents and reparation awarded on same basis. The rate of 11.5 cents used as the standard is made by the use of the scale prescribed in Memphis-Southwestern Investigation, 77 I. C. C. 473, being for the distance of 381 miles, via the Frisco, between Pacific and Fort Smith. The Missouri Pacific route between those points is 530 miles. (Rate in cents per 100 lb.)

## Southwestern Producers Urged To Be Prepared for Hearings

WITH a view to keeping the hearings in No. 17,000, Part 11, Sand, Gravel, Crushed Stone and Shells Within the Southwest, and the cases joined therewith within bounds, the commission has issued a notice pointing out what should and what should not be done. The hearings, it says, as announced September 27, will begin at New Orleans on December 5 and at the close of the hearing at New Orleans hearing will be begun at Dallas immediately.

The notice said it was believed that if the parties who expected to submit definite proposals at the hearing would exchange such proposals prior to the hearings, much less time would be consumed in these proceedings than otherwise. It said therefore that both present and prospective parties to the proceedings would be expected to exchange with each other, on or before November 21, the proposals they expected to submit at the hearing and to furnish copies of proposals so exchanged to the commission. The commission said it was very desirable that duplication of testimony be avoided; that witnesses make direct response to questions, with brief explanations when necessary; that the testimony be confined to "the realm of fact, leaving for counsel to make deductions therefrom upon brief or oral argument at the proper time and place." Continuing, the notice says:

To the end that testimony offered may concern only controverted and material facts all present and prospective parties are urged to give consideration to the following questions and, if possible, be prepared at the opening of the hearing to state for the record the result of such consideration:

(1) Assuming that as a result of these proceedings a basis of rates is prescribed for the future, can agreement be reached as to the list of commodities that should be covered by the rates prescribed?

(2) Can agreement be reached as to average value at shiping point of the different commodities involved in these proceedings?

(3) If the respective commodities differ in value, does such difference warrant a difference in the transportation rate?

(4) Can agreement be reached as to the average loading of each commodity?

(5) Can agreement be reached as to the points of shipment of each of the commodities in the territory covered by the proceedings?

(6) Can agreement be reached as to the extent of the movement for a representative period of the different commodities?

(7) Is it agreed that the operating and transportation conditions throughout the general territory covered by these proceedings are similar?

(8) Is it agreed that the same basis or level of rates should apply on these commodities throughout the general territory covered by the proceedings?

(9) Assuming that the same basis or level of rates should apply throughout the general territory, can the parties agree as to how this should be accomplished? That is, by the prescription of a mileage scale of rates, group basis or point to point basis?

(10) The enumeration of the above questions for consideration is not meant to exclude from consideration by the parties of other matters which might occur to them and upon which an agreement might be reached. As has been stated, it is desired that testimony be offered only upon controverted and material facts.

[The correct date of the hearing is as given, December 5, although some copies of ROCK PRODUCTS, October 15 issue, gave it as November 5.]

## Chicago and Gary Switching Districts Rate Hearing

THAT any rate adjustment that will not permit a free movement of sand and gravel for a distance of 40 miles is fundamentally unsound, was the pivotal contention of complainant witnesses at the hearing in docket 19557, and Sub. 1, Chicago Gravel Co. against the Indiana Harbor Belt and others, at Chicago, October 17, 18 and 20, before Examiner Fuller. The complainants seek the establishment of rates on sand, gravel and crushed stone from Joliet and Plainfield, Ill., to the Chicago and Gary switching districts on a parity with rates applying within the district. Two Illinois commission cases, dockets 17179 and 17335, were joined with the interstate case. Walter Kaylor, of the Illinois commission, sat with Examiner Fuller.

The existing rates from Joliet are 65 cents, single line haul, and 85 cents, joint line. The commodities move within the district principally on an intrastate single line rate of 40 cents—some taking the interstate rate of 50 cents. Representatives of complaining interests said they sought a parity between the rates applying from the origin points and the rates within the district, rather than have their rates lowered. Crushed stone is the competing commodity produced within the district.

Thomas E. Bond, traffic manager of the E. J. & E., representing the defendant carriers, said the Joliet carriers were willing to give the complainants a temporary rate of 55 cents, and that a petition requesting permission to do that had been filed. He said he believed the existing single line rate from Joliet was not too high and that the joint line rate was too low, but that a 5 cent

differential, Joliet over the district, would enable the Joliet pits to do business within the district. An increase in the Chicago district rates, he said, was the ideal solution. He called attention to the fact that the Chicago district rates were before the commission in a pending case and that the existing rate from Joliet had been passed on by the commission in the Chicago gravel cases, docket 17817. He said the traffic from Joliet had fallen off since the parity between Joliet and the district had been destroyed by the Jones 420 adjustment, at which time the producing territory outside of Chicago was zoned and blanketed, as to rates, and he believed commercial considerations dictated a spread of 5 cents between zone 1 and the district.

The following witnesses appeared for complainants and supporting interveners: W. N. Carter, president, National Stone Co., Joliet; Stuart Gardiner, treasurer of the same company; J. P. Enright, sales manager, Lincoln Crushed Stone Co., Joliet; Frank Nuessmeyer, Margraf Stone Co., Joliet, and William Frogner, traffic manager, Chicago Gravel Co. They introduced testimony to show that there had been a decided diminution (about two-thirds) in the movement into the district from the origin points involved since the establishing of the existing rates—September 10, 1925—and that the existing spread in the rates was an insuperable obstacle to a normal flow of the commodities. They stressed the fact that Joliet had been on a parity with the district prior to September 10, 1925, and contended that a 5 cent differential, as suggested by the defendant carriers, would make it impossible for Joliet to compete.

The most strenuous opposition to the prayer of the complainants came from interveners—shippers within the district and in Indiana.

W. J. Womer, traffic manager, Consumers Co., which has plants both within the district and outside, testifying on behalf of the producers within the district, said he believed the Jones 420 adjustment was as near an ideal solution of the problem of relating the producers in and around the Chicago district as could be devised. He said that any modification of that adjustment would mean a flood of complaints from other producers—that if the complainants got a lower rate than other zone 1 producers, all the other producers in zone 1 would immediately be after similar relief. He said that prior to that adjustment sand and gravel rates had been in a chaotic condition and that it had brought uniformity and stability, which were essential to the prosperity of the industry. He said there was overproduction within the district; that only about 50% of that produced in the district could find a market in the district, and it was his contention that complainants had a favorable adjustment in other directions, and that the level of the rates established under the Jones adjustment was comparatively low, or at least not unduly high.

E. A. Keappler of the Dolphine Sand and Gravel Co., Chicago, and E. Guy Sutton of the Neal Gravel Co., Matoon, Ind., also gave testimony opposing the complaint.

## Correction

ON page 93, October 15 issue, the table given in the item "Proposed New Rates for Sand and Gravel in the South" is a tabulation of recommended arbitraries and not rates as stated erroneously.

## Eleventh Chemical Exposition

ONE of the most remarkable achievements in the history of industry has just been completed with the close of the Eleventh Exposition of Chemical Industries at the Grand Central Palace in New York City, where probably the greatest collection of the various chemical and allied industries in the history of the exposition were assembled. Four floors of the building were occupied by the 367 exhibitors. Registrations totaled close to 16,000 during the week and there were about 75,000 individual admissions.

Among new machinery exhibits of interest to the rock products industries were a cantilever filter by the United Filter Co. and an interior filter shown for the first time by the Dorr Co. The drying machinery opened up some very new developments, among which were the exhibits by the Gordon Davis Engineering Co. and James Hunter Machine Co. Several companies showed some interesting type of material handling equipment. Among the crushers were the Hardinge Co.'s conical ball mill and a type of rod mill; the Bethlehem Steel Co.'s pulverizer, whose principal features are the revival of the skilled workmanship of the rolls and the methods of handling the raw materials. The various screening processes by the W. S. Tyler Co., Niagara Concrete Mixer Co., Norwood Engineering Co., Orville Simpson Co., C. W. Hunt & Co., and the Traylor Vibrator Co. created comment. The exhibit of the Western Precipitation Co. of the Cottrell system of air cleaning by electrical precipitation was one of the greatest of its kind. In the container section the Wheeling Corrugated Steel Co. showed a new corrugated drum and barrel which they manufactured on the premises. General Electric Co.'s hydrogen welding process using an electric spark as the heating element for hydrogen welding received much favorable comment by the visitors. Another exhibit of great interest was that of vitaglass, which transmits actinic or ultra-violet ray, which is life- and health-giving and is a development of the chemical industry.

Various exhibits in the Southern Section by the Southern Railway Co., the Alabama, Birmingham and Coast Railway and the Southern Pacific Lines contained exhibits of raw materials useful in the chemical industries throughout the country. The Canadian Section and the Ontario Department of Mines covered a wide range of products and raw materials that were decidedly interesting and well displayed. Several rock products producers, among them being Peerless White Lime Co., St. Louis, were exhibitors also. The government's exhibits were probably the finest ever sent any exposition and contained some extremely valuable data in the fertilizer sections and nitrate division. The exhibits of instruments of precision contained some of the latest processes and practices as used in the chemical industries.

An outstanding accomplishment was the student's course under the chairmanship of Prof. W. T. Read, head of the department of chemistry at the Texas Technological College, Lubbock, Texas. About 160 students enrolled for the course. One hundred and two were students from various educational institutions and the others were professors, engineers and representatives from industry sent by their respective organizations for the purpose of taking the course. After the discussion a general inspection of the exposition was made and actual demonstration of various processes explained. The lectures during the course were given by outstanding men in each particular case.

The fifth annual chemical industries banquet was held at the Hotel Roosevelt on Wednesday, September 28, in conjunction with the exposition. Dr. John E. Teeple, treasurer, American Chemical Society, was toastmaster and the speakers included Dr. John L. Davis; L. V. Redman, vice-president, Bakelite Corp.; C. C. Concannon, chief, research division, Bureau of Foreign and Domestic Commerce, and E. L. Allen, president, Mathieson Alkali Works.

The next, the twelfth exposition of chemical industries, will be held at the Grand Central Palace, New York, during the week of May 6, 1929.

## Welding Conference Held in Minnesota

USERS of welding equipment, as well as all those interested in welding in its various phases as applied to repairs or manufacture, were invited to attend the welding conference held at the University of Minnesota, Minneapolis, Minn., on October 20, 21 and 22 under the direction of the mechanical engineering department of the College of Engineering and Architecture, University of Minnesota.

Prof. S. C. Shipley, head of the mechanical engineering department, presided over the meeting, and the following are some of the papers presented and discussed: "General Aspects of Oxy-Acetylene Welding and Cutting," by R. W. Rogers, Oxweld Acetylene Co., New York; "Some of the Most Recent Uses of Arc Welding in Industry," by A. G. Bissell, welding engineer of Westinghouse Electric Co., Pittsburgh, Penn.; "Procedure Control in the Welding Industry," by J. W. Haygood, Linde Air Products Co., Chicago; "Apparatus Manufactured by Arc Welding," by W. M. B. Brady, welding specialist, General Electric Co., Chicago; "Stelliting Metal Parts," by E. F. Smith, Haynes Stellite Co., Chicago; "The Use of Arc Welded Steel to Replace Castings," by A. D. Davis, vice-president, Lincoln Electric Co., Cleveland, Ohio, and "Oxwelded Joint as a Mechanical and Structural Detail," by H. H. Moss, Linde Products Co., New York.

Motion pictures and exhibits of equipment and of representative welding jobs by the manufacturers of welding equipment were also features of the meeting.

# The Rock Products Market

## Wholesale Prices of Crushed Stone

**Prices given are per ton, F.O.B., at producing point or nearest shipping point**

### Crushed Limestone

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | |
| Buffalo, N. Y. | 1.30 | 1.30 | 1.30 | 1.30 | 1.30 | 1.30 |
| Chaumont, N. Y. | .50 | 1.75 | 1.75 | 1.50 | 1.50 | 1.50 |
| Chazy, N. Y. | .75 | ........ | 1.60 | 1.30 | 1.30 | 1.30 |
| Coldwater, N. Y.—Dolomite | | | 1.50 all sizes | | | |
| Danbury, Conn. | 2.25 | 2.25 | 2.00 | 1.75 | 1.50 | ........ |
| Dundas, Ont. | .30 | 1.05 | 1.05 | .90 | .90 | .90 |
| Frederick, Md. | .50@1.00 | 1.35@1.50 | 1.15@1.50 | 1.10@1.15 | 1.05@1.10 | 1.05@1.10 |
| Munns, N. Y. | 1.00 | 1.50 | 1.25 | 1.30 | 1.25 | ........ |
| Northern New Jersey | 1.60 | 1.50@1.80 | 1.30@2.00 | 1.40@1.60 | 1.40@1.60 | ........ |
| Prospect, N. Y. | 1.00 | 1.40 | 1.25 | 1.25 | 1.25 | ........ |
| Rochester, N. Y. | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| Walford, Penn. | ........ | ........ | 1.35h | 1.35h | 1.35h | 1.35h |
| Watertown, N. Y. | 1.00 | ........ | 1.75 | 1.50 | 1.50 | 1.50 |
| Western New York | .85 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| **CENTRAL:** | | | | | | |
| Afton, Mich. | ........ | ........ | .50 | .75 | ........ | 1.50 |
| Alton, Ill. | 1.85 | ........ | 1.85 | ........ | ........ | ........ |
| Buffalo and Linwood, Iowa | 1.10 | ........ | 1.45 | 1.25 | 1.30 | 1.30 |
| Chasco, Ill. | 1.00@1.30 | ........ | 1.00@1.15 | ........ | 1.00@1.15 | ........ |
| Columbia, Krause, Valmeyer, Ill. | 1.10@1.50 | 1.10@1.25 | 1.20@1.35 | 1.10@1.35 | 1.10@1.35 | ‖1.25 |
| Flux (Valmeyer) | 1.10@1.50 | ........ | ........ | 1.75 | ........ | 1.75 |
| Greencastle, Ind. | 1.25 | 1.25 | 1.15 | 1.05 | .95 | .95 |
| Lannon, Wis. | .80 | 1.00 | 1.00 | .90 | .90 | .90 |
| McCook, Ill. | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| River Rouge, Mich. | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 | 1.20 |
| Milltown, Ind. | ........ | .90@1.00 | 1.00@1.10 | .90@1.00 | .85@ .90 | .85@ .90 |
| Mt. Vernon, Ill. | 1.10@1.20 | 1.00 | 1.00 | 1.00 | 1.00 | ........ |
| Sheboygan, Wis. | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | ........ |
| Stone City, Iowa | ........ | ........ | 1.20 | 1.10 | 1.00 | ........ |
| St. Vincent de Paul, Que. | .70 | 1.35 | 1.00 | .85 | .80 | 1.25 |
| Toledo, Ohio | 1.60 | 1.70 | 1.70 | 1.60 | 1.60 | 1.60 |
| Toronto, Ont. | 1.55 | 2.05 | 2.05 | 1.90 | 1.90 | 1.90 |
| Waukesha, Wis. | .90 | ........ | ........ | .90 | .90 | .90 |
| Wisconsin Points | .50 | ........ | 1.00 | .90 | .90 | ........ |
| Youngstown, Ohio | .70j | 1.25l@1.35h | 1.25l@1.35h | 1.25l@1.35h | 1.25l@1.35h | 1.25l@1.35h |
| **SOUTHERN:** | | | | | | |
| Alderson, W. Va. | .50 | 1.40 | 1.35 | 1.25 | 1.20 | 1.15 |
| Atlas, Ky. | .50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Brooksville, Fla. | .75 | ........ | 2.65 | 2.65 | 2.40 | 2.00 |
| Cartersville, Ga. | ........ | 1.50 | 1.50 | 1.35 | 1.05 | ........ |
| Chico and Bridgeport, Tex. | 1.00 | 1.30 | 1.25 | 1.20 | 1.05 | 1.00 |
| El Paso, Tex. | 1.00 | 1.00 | 1.00 | 1.00 | ........ | ........ |
| Ft. Springs, W. Va. | .50 | 1.35 | 1.35 | 1.20 | 1.20 | ........ |
| Graystone, Ala. | | | Crusher run, screened, $1 per ton | | | |
| Kendrick and Santos, Fla. | | | 3½ in. and less, $1 per ton | | | |
| Ladds, Ga. | ........ | 1.65 | 1.65 | 1.35 | 1.15 | 1.15 |
| New Braunfels, Tex. | .60 | 1.25 | 1.10 | .90 | .90 | .90 |
| Rocky Point, Va. | .50@ .75 | 1.40@1.60 | 1.30@1.40 | 1.15@1.25 | 1.10@1.20 | 1.00@1.05 |
| **WESTERN:** | | | | | | |
| Atchison, Kan. | .50 | 1.90 | 1.90 | 1.90 | 1.90 | 1.80 |
| Blue Springs & Wymore, Neb. | .25 | 1.45 | 1.45 | 1.35c | 1.25d | 1.20 |
| Cape Girardeau, Mo. | 1.25 | 1.25 | 1.25 | 1.25 | 1.00 | ........ |
| Rock Hill, St. Louis Co., Mo. | 1.35 | 1.35 | 1.35 | 1.25 | 1.25 | 1.50 |
| Sugar Creek, Mo. | 1.15* | 1.60† | 1.60‡ | 1.60§ | 1.00¶ | ........ |

### Crushed Trap Rock

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| Branford, Conn. | .80 | 1.70 | 1.45 | 1.20 | 1.05 | ........ |
| Duluth, Minn. | .90 | 2.00 | 1.75 | 1.55 | 1.25 | 1.25 |
| Dwight, Calif. | 1.00 | 1.00 | 1.00 | .90 | .90 | ........ |
| Eastern Maryland | 1.00 | 1.60 | 1.60 | 1.50 | 1.35 | 1.35 |
| Eastern Massachusetts | .85 | 1.75 | 1.75 | 1.25 | 1.25 | 1.25 |
| Eastern New York | .75 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Eastern Pennsylvania | 1.10 | 1.70 | 1.60 | 1.50 | 1.35 | 1.35 |
| Knippa, Tex. | 2.50 | 2.00 | 1.55 | 1.25 | 1.15 | ........ |
| New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn. | .80 | 1.70 | 1.45 | 1.20 | 1.05 | ........ |
| Northern New Jersey | 1.60 | 2.10 | 1.90 | 1.50 | 1.50 | ........ |
| Oakland and El Cerito, Calif. | 1.00 | 1.00 | 1.00 | .90 | .90 | ........ |
| Richmond, Calif. | .75 | ........ | 1.00 | 1.00 | 1.00 | ........ |
| San Diego, Calif. | .50@ .75 | 1.25@1.50 | 1.25@1.50 | 1.10@1.25 | 1.10@1.25 | ........ |
| Springfield, N. J. | 1.70@1.80 | 2.10@2.20 | 2.00@2.10 | 1.60@1.70 | 1.60@1.70 | 1.50@1.60 |
| Toronto, Ont. | ........ | 3.58@4.05 | 3.05@3.80 | ........ | ........ | ........ |
| Westfield, Mass. | .60 | 1.50 | 1.35 | 1.20 | 1.10 | ........ |

### Miscellaneous Crushed Stone

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| Berlin, Utley, Montello and Red Granite, Wis.—Granite | 1.80 | 1.70 | 1.50 | 1.40 | 1.40 | ........ |
| Columbia, S. C. | ........ | 2.00 | 1.90 | 1.90 | 1.75 | ........ |
| Eastern New York—Syenite | .75 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Eastern Penn.—Sandstone | 1.35 | 1.70 | 1.65 | 1.40 | 1.40 | 1.40 |
| Eastern Penn.—Quartzite | 1.20 | 1.35 | 1.25 | 1.20 | 1.20 | 1.20 |
| Emathla, Fla. | | | Crushed flint rock, 2.50 per cu. yd. | | | |
| Graystone, Ala.—Granite | .50 | ........ | ........ | ........ | ........ | ........ |
| Lithonia, Ga. | .75a | 1.75b | 1.60 | 1.45 | 1.35 | ........ |
| Lohrville, Wis.—Granite | 1.65 | 1.70 | 1.65 | 1.45 | 1.50 | ........ |
| Middlebrook, Mo. | 3.00@3.50 | ........ | 2.00@2.25 | 2.00@2.25 | ........ | 1.25@3.00 |
| Richmond, Calif.—Quartzite | .75 | ........ | 1.00 | 1.00 | 1.00 | ........ |
| Rochester, N. Y. | | | Dolomite, all sizes, $1.40 per ton | | | |
| Somerset, Penn. (sand-rock) | | | 1.50 to 1.85 | | | |
| Toccoa, Ga.—Granite | ........ | 1.30 | ........ | ........ | ........ | ........ |

*¼ to ½ in. †¼ to 1 in. ‡¼ to 1¼ in. §¼ to 2¼ in. ¶Dust.
‖Rip rap per ton. (a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2in., 1.30. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05. (e) Agstone to June 15, 1927. [1] ¾ to ¼ in. [2] 1 to ¼ in. [3] 1½ to ¼ in. (A) Plus 4% sales tax, less 2% discount 30 days.

## Agricultural Limestone

### (Pulverized)

| | |
|---|---|
| Alderson, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh | 1.50 |
| Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh | 4.50 |
| Atlas, Ky.—90% thru 100 mesh | 2.00 |
| 50% thru 100 mesh | 1.00 |
| Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh | 1.50 |
| Blackwater, Mo.—100% thru 4 mesh | 1.00 |
| Branchton, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh | 5.00 |
| Cape Girardeau, Mo.—Analysis, $CaCO_3$, 93½%; $MgCO_3$, 3½%; 50% thru 50 mesh | 1.50 |
| Cartersville, Ga.—50% thru 50-mesh | 1.50 |
| Charleston, W. Va.—Marl, per ton, bulk | 3.00 |
| Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk | 2.50 |
| Chico, Tex.—50% thru 50 mesh, 1.75; 50% thru 100 mesh | 2.25 |
| Cypress, Ill.—90% thru 100 mesh | 1.35 |
| Ft. Springs, W. Va.—50% thru 4 mesh | 1.50 |
| Hartford, Conn.—Paper bags, 4.25; cloth bags, 4.75; bulk | 3.25 |
| Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked | 5.00 |
| Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags | 3.95 |
| Bulk | 2.70 |
| Jamesville, N. Y.—Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags, 4.25; bulk | 2.75 |
| Joliet, Ill.—Analysis, 52% $CaCO_3$; 44% $MgCO_3$; 90% thru 100 mesh | 3.50 |
| Knoxville, Tenn.—80% thru 100 mesh; bags, 3.95; bulk | 2.70 |
| Ladds, Ga.—Analysis, $CaCO_3$, 64%; $MgCO_3$, 32%; pulverized; 50% thru 50 mesh | 1.50@ 2.75 |
| Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk | 3.50 |
| Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk, 1.75; bags | 3.75 |
| Marl—Analysis, 90% $CaCO_3$; 10% $MgCO_3$; bulk, 2:25; bags | 4.00 |
| Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton | 2.00 |
| Middlebury, Vt.—Analysis, 90.05% $CaCO_3$; 90% thru 50 mesh | 6.00 |
| Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk | 1.35@ 1.60 |
| Olive Hill, Ky.—90% thru 4 mesh | 1.00 |
| Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100 | 2.50@ 2.75 |
| 100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk | 3.60 |
| 99% thru 100, 85% thru 200; bags, 7.00; bulk | 5.50 |
| Rocky Point, Va.—Analysis, $CaCO_3$, 97%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk | 2.00 |
| Syracuse, N. Y.—Analysis 89% $CaCO_3$; $MgCO_3$, 4%; bags, 4.25; bulk | 2.75 |
| Toledo, Ohio—30% thru 50 mesh | 2.25 |
| Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk | 2.50 |
| West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 50% thru 100 mesh; cloth bags, 4.75; paper, 4.25; bulk | 3.25 |
| Carload, 7.50; less than carload | 9.00 |

## Agricultural Limestone

### (Crushed)

| | |
|---|---|
| Alton, Ill.—Analysis, 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh | 3.00 |
| Atlas, Ky.—90% thru 4 mesh | 1.00 |
| Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5%; $MgCO_3$; 90% thru 10 mesh | 1.50 |

(Continued on next page)

## Agricultural Limestone

| | | |
|---|---|---|
| Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 90% thru 100 mesh | | 3.50 |
| Chicago, Ill. — 50% thru 100 mesh; 90% thru 4 mesh | | .80 |
| Columbia, Krause, Valmeyer, Ill. — Analysis, 90% $CaCO_3$; 100% thru 4 mesh | 1.10@ | 1.50 |
| Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh | | 1.35 |
| Danbury, Conn.—Analysis, 79% $CaCO_3$, 11% $MgCO_3$; 60% thru 100 mesh; 80% thru 50 mesh; 100% thru 4 mesh; bags, 4.25; bulk | | 3.25 |
| Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh | | 1.00 |
| Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh | | 1.50 |
| Kansas City, Mo. — 50% thru 100 mesh | | 1.00 |
| Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh | | 2.00 |
| Screenings (¼ in. to dust) | | 1.00 |
| Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92¼ $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk | | 1.60 |
| Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh | 1.85@ | 2.35 |
| McCook, Ill.—90% thru 4 mesh | | .90 |
| Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 100% thru 4 mesh; 20% thru 100 mesh | | 1.50 |
| Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh | | 1.50 |
| Mountville, Va. — Analysis, 62.54% $CaCO_3$; $MgCO_3$, 35.94%, 100% thru 20 mesh; 50% thru 100 mesh, bags | | 5.00 |
| Pixley, Mo. — Analysis, 96% $CaCO_3$; 50% thru 50 mesh | | 1.25 |
| 50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh | | 1.65 |
| River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk | .80@ | 1.40 |
| Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh | | .75 |
| Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes | | 1.25 |
| Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh | | 2.30 |

## Pulverized Limestone for Coal Operators

| | | |
|---|---|---|
| Hillsville, Penn., sacks, 4.50; bulk | | 3.00 |
| Joliet, Ill.—Analysis, 55% $CaCO_3$; 45% $MgCO_3$; 95% thru 100 mesh; bulk | | 3.50 |
| Piqua, Ohio, sacks, 4.50@5.00; bulk | 3.00@ | 3.50 |
| Rocky Point, Va.—85% thru 200 mesh, bulk | 2.25@ | 3.50 |
| Waukesha, Wis.—90% thru 100 mesh, bulk | | 4.50 |

*Bags extra.

## Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

| | | |
|---|---|---|
| Buffalo, N. Y. | 2.00@ | 2.50 |
| Cedarville and S. Vineland, N. J.—Damp | | 1.75 |
| Dry | | 2.25 |
| Estill Springs and Sewanee, Tenn. | | 1.50 |
| Franklin, Penn. | | 2.00 |
| Gray Summit and Klondike, Mo. | 1.75@ | 2.00 |
| Klondike, Mo. | | 2.00 |
| Los Angeles, Calif.—Washed | | 5.00 |
| Mendota, Va. | 2.25@ | 2.50 |
| Michigan City, Ind. | | .35 |
| Mineral Ridge and Ohlton, Ohio | | 2.50 |
| Oceanside, Calif. | | 3.00 |
| Ohlton, Ohio | | 2.50 |
| Pittsburgh, Penn. | 3.00@ | 4.00 |
| Red Wing, Minn. | | 1.50 |
| Ridgway, Penn. | | 2.50 |
| Rockwood, Mich. | 2.75@ | 3.25 |
| Round Top, Md. | | 2.00 |
| San Francisco, Calif. | 4.00@ | 5.00 |
| Silica, Va. | | 2.50 |
| St. Louis, Mo. | | 2.00 |
| Sewanee, Tenn. | | 1.50 |
| Thayers, Penn. | | 2.50 |
| Zanesville, Ohio | | 2.50 |

## Miscellaneous Sands

| City or shipping point | Roofing sand | Traction |
|---|---|---|
| Beach City, Ohio | ............ | 1.75 |
| Columbus, Ohio | ............ | .15@ .30 |
| Dresden, Ohio | ............ | 1.25 |
| Eau Claire, Wis. | 4.25 | ............ |

(Continued on next page)

# Wholesale Prices of Sand and Gravel

**Prices given are per ton, F.O.B., producing plant or nearest shipping point**

## Washed Sand and Gravel

| City or shipping point | Fine Sand, 1/10 in. down | Sand, ¼ in. and less | Gravel, ½ in. and less | Gravel, 1 in. and less | Gravel, 1½ in. and less | Gravel, 2 in. and less |
|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | |
| Ambridge & So. H'g'ts, Penn. | 1.25 | 1.25 | 1.15 | .85 | .85 | .85 |
| Attica and Franklinville, N. Y. | .65 | .65 | ........ | ........ | .65 | ........ |
| Boston, Mass.‡ | 1.40 | 1.40 | 2.25 | ........ | 2.25 | 2.25 |
| Buffalo, N. Y. | 1.10 | 1.05 | 1.05 | 1.05 | ........ | 1.05 |
| Erie, Penn. | ........ | 1.00* | ........ | 1.50* | 1.75* | ........ |
| Farmingdale, N. J. | .80 | .70 | 1.15 | 1.40 | ........ | ........ |
| Leeds Junction, Me. | ........ | .50 | 1.75 | ........ | 1.25 | 1.00c |
| Machias Jct., N. Y. | .75 | .75 | .85 | .75 | .75 | .75 |
| Montoursville, Penn. | 1.00 | .75@ .85 | .75 | .75 | .75 | .75 |
| Northern New Jersey | .50 | .50 | 1.00@1.25 | 1.00@1.25 | 1.00@1.25 | ........ |
| Portland, Me. | ........ | 1.00 | 2.25 | ........ | 2.00 | ........ |
| Shining Point, Penn. | ........ | ........ | 1.00 | 1.00 | 1.00 | 1.00 |
| Somerset, Penn. | ........ | 2.00 | ........ | ........ | ........ | ........ |
| South Heights, Penn. | 1.25 | 1.25 | .85 | .85 | .85 | .85 |
| Washington, D. C. | ........ | .60 | 1.70 | 1.50 | 1.30 | 1.30 |
| **CENTRAL:** | | | | | | |
| Algonquin and Beloit, Wis. | .50 | .40 | .60 | .60 | .60 | .60 |
| Appleton and Mankato, Minn. | ........ | .45 | 1.25 | 1.25 | 1.25 | 1.25 |
| Attica, Ind. | | | All sizes .75@.85 | | | |
| Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill. | .25@ .80 | .50@ .70 | .10@ .40 | .50@ .70 | .60@ .80 | .60@ .80 |
| Barton, Wis. | ........ | .50 | .50 | .60 | .60 | .60 |
| Chicago district, Ill. | .70 | .55 | .55 | .60 | .60 | .60 |
| Columbus, Ohio | ........ | .75 | .75 | .75 | .75 | ........ |
| Des Moines, Iowa | ........ | .30 | 1.30 | 1.30 | 1.30 | 1.30 |
| Eau Claire, Chippewa Fls., Wis. | .40 | .40 | .50@ .85 | .85@ .90 | .85@ .90 | ........ |
| Elkhart Lake, Wis. | .50 | .30 | .30 | .60 | .50 | .40 |
| Ferrysburg, Mich. | ........ | .50@ .80 | .60@1.00 | .60@1.00 | ........ | .50@1.25 |
| Ft. Dodge, Iowa | .85 | .85 | 2.05 | 2.05 | 2.05 | 2.05 |
| Grand Haven, Mich. | ........ | .60@ .80 | .70@ .90 | .70@ .90 | ........ | .70@ .90 |
| Grand Rapids, Mich. | .50 | .50 | .90 | .80 | .70 | .70 |
| Hamilton, Ohio | ........ | 1.00 | ........ | ........ | 1.00 | ........ |
| Hersey, Mich. | .50 | .50 | ........ | .60 | ........ | .70 |
| Humboldt, Iowa | .50 | .50 | 1.50 | 1.50 | 1.50 | 1.50 |
| Indianapolis, Ind. | .60 | .60 | .75 | .75 | .75 | .75 |
| Joliet, Plainfield & Hammond, Ill. | .60 | .50 | .50 | .60 | .60 | .60 |
| Mason City, Iowa | .50@ .60 | .50@ .60 | 1.30 | 1.30 | 1.20 | 1.20 |
| Mankato, Minn. | ........ | ........ | ........ | 1.25 | 1.25 | 1.25 |
| Mattoon, Ill. | | | .75@.85 all sizes | | | |
| Milwaukee, Wis. | .96 | .91 | 1.06 | 1.06 | 1.06 | 1.06 |
| Minneapolis, Minn. | .65* | .65* | 1.75* | 1.75* | 1.75* | 1.75* |
| Moline, Ill. | .60@ .85 | .60@ .85 | 1.00@1.20 | 1.00@1.20 | 1.00@1.20 | 1.00@1.20 |
| Northern New Jersey | .40@ .50 | .40@ .50 | 1.40 | 1.35 | 1.25 | ........ |
| Pittsburgh, Penn. | 1.25 | 1.25 | .85 | .85 | .85 | .85 |
| Silverwood, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| St. Louis, Mo. | 1.20e | 1.45f | 1.55a | 1.45 | 1.45 | 1.45 |
| St. Paul, Minn. | .35 | .35 | 1.25 | 1.25 | ........ | 1.25 |
| Terre Haute, Ind. | .75 | .60 | .85 | .80 | .75 | .75 |
| Wolcottville, Ind. | .75 | .75 | .75 | .75 | .75 | .75 |
| Waukesha, Wis. | ........ | .45 | .60 | .60 | .65 | .65 |
| Winona, Minn. | .50 | .40 | .50 | 1.00 | 1.00 | 1.15 |
| Zanesville, Ohio | ........ | .60 | .50 | .60 | .80 | ........ |
| **SOUTHERN:** | | | | | | |
| Charleston, W. Va. | 1.40 | 1.40 | 1.40 | 1.40 | 1.40 | 1.40 |
| Brewster, Fla. | .45 | .45 | 2.25 | ........ | ........ | ........ |
| Brookhaven, Miss. | 1.25 | .70 | 1.25 | 1.00 | .70 | .70 |
| Chattahoochie River, Fla. | ........ | .70 | ........ | 1.75 | ........ | ........ |
| Eustis, Fla. | ........ | .50@ .60 | ........ | ........ | ........ | ........ |
| Ft. Worth, Texas | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Knoxville, Tenn. | 1.00 | 1.00 | 1.20 | 1.20 | 1.20 | 1.20 |
| Macon, Ga. | ........ | .50 | .50 | ........ | ........ | ........ |
| New Martinsville, W. Va. | 1.00 | .90@1.00 | ........ | 1.10@1.20 | ........ | .80@ .90 |
| Roseland, La. | .25 | .25 | 1.25 | 1.00 | .65 | .65 |
| **WESTERN:** | | | | | | |
| Kansas City, Mo. | ........ | .70@ .75 | ........ | ........ | ........ | ........ |
| Crushton, Durbin, Kincaid, Largo, Rivas, Calif. | .10@ .40 | .10@ .40 | .50@1.00 | .50@1.00 | .50@1.00 | .50@1.00 |
| Oregon City, Ore. | 1.25* | 1.25* | 1.25* | 1.25* | 1.25* | 1.25* |
| Phoenix, Ariz. | 1.25 | 1.00 | 2.00 | 1.50 | 1.75 | 1.00 |
| Pueblo, Colo. | .70 | .60 | ........ | 1.20 | ........ | 1.15 |
| San Diego, Calif. | ........ | .40@ .50 | .80@1.00 | .80@1.00 | .65@ .80 | .65@ .80 |
| Steilacoom, Wash.* | .50 | .25@ .50 | .25@ .50 | .25@ .50 | .25@ .50 | .25@ .50 |

## Bank Run Sand and Gravel

| City or shipping point | Fine Sand, 1/10 in. down | Sand, ¼ in. and less | Gravel, ½ in. and less | Gravel, 1 in. and less | Gravel, 1½ in. and less | Gravel, 2 in. and less |
|---|---|---|---|---|---|---|
| Algonquin and Beloit, Wis. | | | Dust to 3 in., .40 | | | |
| Brookhaven, Miss. | ........ | ........ | ........ | ........ | ........ | .60 |
| Buffalo, N. Y. | 1.10 | .95 | ........ | .85 | ........ | .85 |
| Burnside, Conn. | .75 | ........ | ........ | ........ | ........ | ........ |
| Des Moines, Iowa | .50 | ........ | ........ | ........ | ........ | ........ |
| Dresden, Ohio | .50 | .60 | .70 | .65 | .65 | .60 |
| East Hartford, Conn. | .80*d | ........ | ........ | ........ | ........ | ........ |
| Eau Claire, Chippewa Fls., Wis | ........ | ........ | ........ | ........ | .65 | ........ |
| Gainesville, Texas | ........ | ........ | ........ | ........ | .55 | ........ |
| Grand Rapids, Mich. | ........ | ........ | ........ | .50 | ........ | ........ |
| Hamilton, Ohio | ........ | ........ | ........ | ........ | .68 | ........ |
| Hersey, Mich. | ........ | ........ | ........ | .50 | ........ | ........ |
| Indianapolis, Ind. | | Mixed gravel for concrete work, at .65 | | | | |
| Lindsay, Texas | ........ | 1.10 | ........ | ........ | .55 | ........ |
| Macon, Ga. | .35 | ........ | ........ | ........ | ........ | ........ |
| Mankato, Minn. | .30 | ........ | ........ | ........ | ........ | ........ |
| Moline, Ill. (b) | .60 | .60 | Concrete gravel, 50% G., 50% S., 1.00 | | | |
| Oregon City, Ore. | 1.25* | 1.25* | 1.25* | 1.25* | 1.25* | 1.25* |
| Roseland, La. | ........ | ........ | ........ | ........ | .50 | ........ |
| Somerset, Penn. | ........ | 1.85@2.00 | ........ | 1.50@1.75 | ........ | ........ |
| St. Louis, Mo. | | | Mine run gravel, 1.55 per ton | | | |
| Summit Grove, Ind. | .50 | .50 | .50 | .50 | .50 | .54 |
| Winona, Minn. | .60 | .60 | .60 | .60 | .60 | .60 |
| York, Penn. | 1.10 | ........ | ........ | ........ | ........ | ........ |

*Cubic yd. ‡Delivered on job by truck. (a) ⅝-in. down. (b) River run. (c) 2½-in. and less. ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River.

## Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

| City or shipping point | Molding, fine | Molding, coarse | Molding, brass | Core | Furnace lining | Sand blast | Stone sawing |
|---|---|---|---|---|---|---|---|
| Aetna, Ill. | | | | .30@ .35 | | | |
| Albany, N. Y. | 2.10 | 2.00 | 2.25 | 1.50 | | 4.00g | |
| Arenzville, Ill. | 1.50@1.75 | | | 1.00 | | | |
| Beach City, Ohio | 1.75 | 1.75 | | 1.75 | 1.75@2.00 | | |
| Buffalo, N. Y. | 1.50 | 1.50 | | 2.00@2.50 | | | |
| Columbus, Ohio | 1.50@2.00 | 1.25@1.50 | 2.00 | .30 | 1.75@2.00 | 2.75@4.50 | |
| Dresden, Ohio | 1.50@1.75 | 1.35@1.50 | 1.50@1.75 | 1.25 | 1.35 | | |
| Eau Claire & Chippewa Falls, Wis. | | | | | | 3.00 | |
| Elco & Tamms, Ill. | Ground silica per ton in carloads—18.00@31.00 | | | | | | |
| Estill Springs and Sewanee, Tenn. | 1.25 | | | 1.25 | | 1.35@1.50 | |
| Franklin, Penn. | 1.75 | 1.75 | | 1.75 | 1.75 | | |
| Kasota, Minn. | | | | | | | 1.00 |
| Klondike, Mo. | | | | 2.00 | 2.00 | | 2.00 |
| Massillon, O. (a) | 2.00@2.25 | | | | 2.00@3.00 | | |
| Mendota, Va. | Ground flint or silex—16.00@20.00 per ton | | | | | | |
| Michigan City, Ind. | | | | .30@ .35 | | | |
| Millville, N. J. | | | | 1.75b | | 3.50 | |
| Montoursville, Penn. | | | | 1.35@1.60 | 1.25@1.35 | | |
| New Lexington, O. | 2.00 | 1.25 | | | | | |
| Ohlton, Ohio | 1.75 | 1.75 | | 2.00b | 1.75b | 1.75b | |
| Red Wing, Minn. (d) | | | | | 1.50 | 3.00 | 1.50 |
| Ridgway, Penn. | 1.50 | 1.50 | 1.75@2.00c | | | | |
| Round Top, Md. | | | | 1.60 | | 2.25 | |
| San Francisco, Calif.[1] | 3.50† | 5.00† | 3.50† | 3.50@5.00† | 3.50@5.00† | 3.50@5.00† | |
| Silica, Va. | Potters' flint per ton, 9.00@10.00 | | | | | | |
| Thayers, Penn. | 1.25 | 1.25 | | 2.00 | | | |
| Utica, Ill. | .50 | .60 | | .65 | .75 | | |
| Utica, Penn. | 1.75 | 1.75 | | 2.00 | | | |
| Warwick, Ohio | 1.75*@2.00 | 1.75*@2.00 | *1.50 | 1.75*@2.00 | 1.75*@2.00 | | |
| Zanesville, Ohio | 2.00 | 1.50 | 2.00 | 2.00 | 2.00 | | |

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (b) Damp. (c) Shipped from Albany. (g) Dry. (a) Green, 1.50@1.75. (d) Filter sand, 3.00.

## Crushed Slag

| City or shipping point | Roofing | ¼ in. down | ½ in. and less | ¾ in. and less | 1½ in. and less | 2½ in. and less | 3 in. and larger |
|---|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | | |
| Buffalo, N. Y., Erie and Dubois, Pa. | 2.25 | 1.25 | 1.35 | 1.25 | 1.25 | 1.25 | 1.25 |
| Eastern Penn. | 2.50 | 1.20 | 1.50 | 1.20 | 1.20 | 1.20 | 1.20 |
| Northern N. J. | 2.50 | 1.20 | 1.50 | 1.20 | 1.20 | 1.20 | 1.20 |
| Reading, Penn. | 2.50 | 1.25 | | 1.50 | | | |
| Western Penn. | 2.50 | 1.25 | 1.50 | 1.25 | 1.25 | 1.25 | 1.25 |
| **CENTRAL:** | | | | | | | |
| Ironton, Ohio | 2.05* | 1.30* | 1.80* | 1.45* | | 1.45* | |
| Jackson, Ohio | 1.75* | 1.05* | 1.55* | 1.30* | 1.05* | 1.30* | |
| Toledo, Ohio | 1.50 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Youngst'n, O., dist. | 2.00 | 1.25 | 1.35 | 1.35 | 1.25 | 1.25 | 1.25 |
| **SOUTHERN:** | | | | | | | |
| Ashland, Ky. | | 1.45* | | 1.45* | 1.45* | 1.45* | |
| Ensley and Alabama City, Ala. | 2.05 | .80 | 1.35 | 1.25 | .90 | .90 | .80 |
| Longdale, Roanoke, Ruesens, Va. | 2.50 | 1.00 | 1.25 | 1.25 | 1.25 | 1.15 | 1.15 |
| Woodward, Ala. | 2.05* | .80* | 1.35* | 1.25* | .90* | .90* | |

*5c per ton discount on terms.

## Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

| | Finishing hydrate | Masons' hydrate | Agricultural hydrate | Chemical hydrate | Ground burnt lime, Blk. | Ground burnt lime, Bags | Lump lime, Blk. | Lump lime, Bbl. |
|---|---|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | | | |
| Berkeley, R. I. | | | 12.00 | | | | | 2.00 |
| Buffalo, N. Y. | | 12.00 | 12.00 | 12.00 | | | 10.00 | 1.95[4] |
| Chazy, N. Y. | | 8.50 | 7.50 | 10.00 | | 15.50[1] | 8.50 | 14.00 |
| Lime Ridge, Penn. | | | | | 5.00[2] | | | |
| Pittsburgh, Penn. | 12.50 | 8.50 | 8.50 | | 9.00 | 11.00 | | |
| West Stockbridge, Mass. | 12.00 | 10.00 | 5.60 | | | | | 2.00[12] |
| Williamsport, Penn. | | | 10.00 | | | | 6.00 | |
| York, Penn. | | 9.50 | 9.50 | 10.50 | 8.50 | 10.50 | 8.50 | 1.65[7] |
| **CENTRAL:** | | | | | | | | |
| Afton, Mich. | | | | | | | 8.40 | 1.35 |
| Carey, Ohio | 12.50 | 8.50 | 8.15 | | 9.00 | | 8.00 | 1.50 |
| Cold Springs, Ohio | | 8.50 | 8.50 | | | | 8.00 | |
| Cold Springs and Gibsonburg, Ohio | 12.50 | 8.50 | 8.50 | | 9.00 | 11.00 | | |
| Huntington, Ind. | 12.50 | 8.50 | 8.50 | | 9.00 | | 8.00 | |
| Luckey, Ohio | 12.50 | | | | | | | |
| Milltown, Ind. | | 8.50@10.00 | | 10.00[8] | | | 8.50[22] | 1.35[10] |
| Scioto & Marble Cliff, O. | | 8.50 | 8.50 | 9.50 | 8.25 | .62½ | 7.50 | 1.50[3] |
| Sheboygan, Wis. | 11.50 | | | | | | 9.50 | |
| Wisconsin points[6] | | 11.50 | | | | | 9.50 | |
| Woodville, Ohio | 12.50 | 8.50 | 8.50 | | 9.00 | 11.00[9] | 9.00 | 1.50[3] |
| **SOUTHERN:** | | | | | | | | |
| Allgood, Ala. | 12.50 | 10.00 | | | 8.50 | | 8.50 | 1.50 |
| El Paso, Texas | | | | | | | 7.00 | 1.50 |
| Frederick, Md. | | 9.00 | 9.00 | 9.50 | 7.50 | 9.00 | 7.50 | 9.00 |
| Graystone & Landmark, Ala. | 12.50 | 10.00 | 10.00 | 10.00 | | | 8.50 | 1.50 |
| Keystone, Ala. | 12.50 | 10.00 | 9.00 | 11.00 | | | 8.00 | 1.50 |
| Knoxville, Tenn. | 20.25 | 10.00 | 10.00 | 10.00 | | | 8.50 | 1.50 |
| New Braunfels, Tex. | 18.00 | 12.00 | 10.00 | 12.00 | 10.00 | | 9.50 | |
| Ocala, Fla. | | 11.50 | 9.00 | | | 1.40[5] | 11.00 | |
| Saginaw, Ala. | 12.50 | 10.00 | 9.00 | 10.00 | | | 8.50 | 1.50 |
| **WESTERN:** | | | | | | | | |
| Kirtland, N. M. | | | | | | | 15.00 | |
| Limestone, Wash. | 15.00 | 15.00 | 10.00 | 15.00 | 16.50 | 16.50 | 16.50 | 2.09 |
| Los Angeles, Calif. | 19.00 | 19.00 | 14.00 | | 16.20 | | 12.50 | 2.50 |
| Dittlinger, Tex. | | 12.00@13.00 | | | | | 9.50[8] | 1.50[23] |
| San Francisco, Calif. | 20.00 | 20.00 | 13.50 | 21.00 | | | 14.50[30] | 2.15 |
| Tehachapi, Calif.[13] | 17.00 | 15.00 | 12.00@15.00[11] | 17.00 | 16.00 | | 16.00 | 2.00 |
| Seattle, Wash. | 19.00 | 19.00 | 12.00 | 19.00 | 19.00 | | 18.60 | 2.30 |

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel. [5] 180 lb. [6] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] 180-lb. net barrel. 1.65; 280-lb. net barrel, 2.65. [8] To 11.00 [9] 80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00@12.00 [12] To 3.00. [13] Delivered in Southern California. [22] To 9.00. [23] To 1.60. [30] To 16.50.

## Miscellaneous Sands

(Continued)

| City or shipping point | Roofing Sand | Traction |
|---|---|---|
| Estill Springs and Sewanee, Tenn. | 1.35@ 1.50 | 1.35@ 1.50 |
| Franklin, Penn. | | 1.75 |
| Michigan City, Ind. | | .30 |
| Montoursville, Penn. | | 1.10 |
| Ohlton, Ohio | *1.75 | *1.75 |
| Red Wing, Minn. | | 1.00 |
| Round Top, Md. | 2.25 | 1.75 |
| San Francisco, Calif. | 3.50 | 3.50 |
| Thayers, Penn. | | 2.25 |
| Warwick, Ohio | | 2.00 |
| Zanesville, Ohio | | 2.50 |

*Damp.

## Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

| | |
|---|---|
| **Baltimore, Md.:** | |
| Crude talc (mine run) | 3.00@ 4.00 |
| Ground talc (20-50 mesh), bags | 10.00 |
| Cubes | 55.00 |
| Blanks (per lb.) | .08 |
| Pencils and steel worker's crayons | .08 |
| Per gross | 1.00@ 1.50 |
| **Chatsworth, Ga:** | |
| Crude talc, grinding | 5.00 |
| Ground talc (150-200 mesh) | 10.00 |
| Pencils and steel worker's crayons, per gross | 1.00@ 2.00 |
| **Chester, Vt.:** | |
| Ground talc (150-200 mesh), paper bags | 9.50@10.50 |
| Same, burlap bags, bags extra | 8.50@ 9.50 |
| **Chicago and Joliet, Ill.:** | |
| Ground (150-200 mesh), bags | 30.00 |
| **Dalton, Ga.:** | |
| Crude talc (for grinding) | 5.00 |
| Ground talc (150-200 mesh), bags | 12.00 |
| Pencils and steel worker's crayons, per gross | 1.00@ 2.50 |
| **Emeryville, N. Y.:** | |
| (Double air floated) including bags; 325 mesh | 14.75 |
| 200 mesh | 13.75 |
| **Glenden, N. C.:** | |
| Crude talc (mine run) | 3.00@ 4.00 |
| Ground talc (150-200 mesh), bags | 8.00@12.00 |
| **Hailesboro, N. Y.:** | |
| Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh | 15.50@20.00 |
| **Henry, Va.:** | |
| Crude (mine run) | 2.75@ 4.00 |
| Ground talc (150-200 mesh), bags | 9.00@14.50 |
| **Joliet, Ill.:** | |
| Crude talc | 5.00 |
| Southern talc | 17.00 |
| Illinois talc | 10.00 |
| **Keeler, Calif.:** | |
| Ground (200-300 mesh), bags | 20.00@30.00 |
| **Natural Bridge, N. Y.:** | |
| Ground talc (125-200 mesh), bags | 10.00@15.00 |

## Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

### Lump Rock

| | |
|---|---|
| Columbia, Tenn.—B.P.L. 65-70% | 3.50@ 4.50 |
| Gordonsburg, Tenn.—B.P.L. 65-70% | 3.75@ 4.50 |
| Mt. Pleasant, Tenn.—B.P.L. 72% | 5.00@ 5.50 |
| Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72% | 5.00 |
| B.P.L. 75% | 6.00 |
| Twomey, Tenn.—B.P.L. 65%, 2000 lb. | 8.00@ 9.00 |

### Ground Rock

(2000 lb.)

| | |
|---|---|
| Centerville, Tenn.—B.P.L. 65% | 8.00 |
| Gordonsburg, Tenn.—B.P.L. 65-70% | 4.00@ 4.50 |
| Mt. Pleasant, Tenn.—B.P.L. 72% | 5.00@ 5.50 |
| Twomey, Tenn.—B.P.L. 65% | 8.00@ 9.00 |

## Florida Phosphate

(Raw Land Pebble)

(Per Ton)

| | |
|---|---|
| Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68% | 3.25 |
| 70% min. B.P.L., Basis 70% | 3.75 |

## Mica

Prices given are net, f.o.b. plant or nearest shipping point.

| | |
|---|---|
| Pringle, S. D.—Mine run, per ton | 125.00 |
| Punch mica, per lb. | .06 |
| Scrap, per ton, carloads | 20.00 |
| Rumney Depot, N. H.—Per ton, | |
| Mine run | 300.00 |
| Clean shop scrap | 25.00 |
| Mine scrap | 22.50@24.00 |
| Roofing mica | 37.50 |
| Punch mica, per lb. | .12 |

Cut mica—50% from Standard List.

## Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

| City or shipping point | Terrazzo | Stucco-chips |
|---|---|---|
| Barton, Wis., f.o.b. cars | ........ | 10.50 |
| Brandon, Vt. — English pink, English cream and coral pink | *12.50 | *12.50 |
| Brandon grey | *12.50 | *12.50 |
| Brighton, Tenn.—All colors and sizes | §3.00 | §3.00 |
| Buckingham, Que.—Buff stucco dash | ........ | 12.00@14.00 |
| Chicago, Ill. — Stucco chips, in sacks, f.o.b. quarries | ........ | 17.50 |
| Crown Point, N. Y.—Mica spar | ........ | 9.00@10.00 |
| Dayton, Ohio | ........ | 6.00@24.00 |
| Easton, Penn.—Green stucco | ........ | 12.00@18.00 |
| Green granite | ........ | 14.00@20.00 |
| Haddam, Conn.—Felstone buff | 15.00 | 15.00 |
| Harrisonburg, Va.—Bulk marble (crushed, in bags) | †12.50 | †12.50 |
| Ingomar, Ohio—Concrete facings and stucco dash | ........ | 8.00@24.00 |
| Middlebrook, Mo.—Red | ........ | 20.00@25.00 |
| Middlebury, Vt.—Middlebury white | ‡9.00 | ‡9.00 |
| Middlebury and Brandon, Vt.—Caststone, per ton, including bags | ........ | 5.50@ 7.50 |
| Milwaukee, Wis. | ........ | 14.00@34.00 |
| New York, N. Y.—Red and yellow Verona | ........ | 32.00 |
| Phillipsburg, N. J.—Royal green granite | ........ | 12.00@14.00 |
| Randville, Mich.—Crystalite crushed white marble, bulk | 5.00@ 7.50 | 4.50@ 7.50 |
| Rose pink granite, bulk | ........ | 12.00 |
| Stockton, Calif.—"Natrock" roofing grits | ........ | 12.00@18.00 |
| Tuckahoe, N. Y.—Tuckahoe white | 12.00 | ........ |
| Wauwatosa, Wis. | ........ | 20.00@32.00 |
| Wellsville, Colo. — Colorado Travertine Stone | 15.00 | 15.00 |

*Carloads, including bags; L.C.L. 14.50.
†C.L. L.C.L. 17.00.
‡Carloads, including bags; L.C.L. 10.00.
§Bulk, car lots, minimum 30 tons.

## Potash Feldspar

| | |
|---|---|
| Auburn and Topsham, Me. — Color white, 98% thru 140-mesh | 19.00 |
| Bristol, Tenn.—Color, white; analysis, $K_2O$, 6 to 10%; $Na_2O$, 2½ to 4%; $SiO_2$, 68 to 78%; $Fe_2O_3$, 12 to 20%; $Al_2O_3$, 16.5 to 18.5%; 99% thru 200 mesh; bulk, depending on grade | 14.50@18.00 |
| Brunswick, Me.—Color, white; 99% thru 140 mesh, bulk | 19.00 |
| Buckingham, Ore.—White, analysis, $K_2O$, 12-13%; $Na_2O$, 1.75%; bulk | 9.00 |
| De Kalb Jct., N. Y.—Color, white, bulk (crude) | 9.00 |
| East Hartford, Conn.—Color, white, 95% thru 60 mesh, bags | 16.00 |
| 96% thru 150 mesh, bags | 28.00 |
| East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk | 19.35 |
| Soda feldspar, crude, bulk, per ton | 22.00 |
| Glen Tay Station, Ont.—Color, red or pink; analysis, $K_2O$, 12.81%; crude | 7.00 |
| Keystone, S. D.—White; bulk (crude) | 8.00 |
| Los Angeles, Calif.—Color, white; analysis, $K_2O$, 12.16%; $Na_2O$, 1.53%; $SiO_2$, 65.60%; $Fe_2O_3$, .10%; $Al_2O_3$, 10.20%; crude | 10.00 |
| Pulverized, 95% thru 200 mesh; bags, 22.00; bulk | 22.00 |
| Murphysboro, Ill.—Color, prime white; analysis, $K_2O$, 12.60%; $Na_2O$, 2.35%; $SiO_2$, 63%; $Fe_2O_3$, .06%; $Al_2O_3$, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk | 20.00 |
| Penland, N. C.—White; crude, bulk | 8.00 |
| Ground, bulk | 16.50 |
| Spruce Pine, N. C.—Color, white; analysis, $K_2O$, 10%; $Na_2O$, 3%; $SiO_2$, 68%; $Fe_2O_3$, 0.10%; $Al_2O_3$, 18%; 99½% thru 200 mesh; bulk | 18.00 |
| Crude | 9.00 |
| Tenn. Mills—Color, white; analysis $K_2O$, 18%; $Na_2O_3$, 10%; 68% $SiO_2$; 99% thru 200 mesh; bulk | 18.00 |
| 99% thru 140 mesh, bulk | 16.00 |
| Toronto, Can.—Color, flesh; analysis $K_2O$, 12.75%; $Na_2O$, 1.96%; crude | 7.50@ 8.00 |

## Chicken Grits

| | |
|---|---|
| Afton, Mich. (Limestone), per ton | 1.75 |
| Belfast and Rockland, Me.—(Limestone), bags, per ton | 10.00 |
| Cartersville, Ga.—(Limestone), per bag | 2.00 |
| Centerville, Iowa—(Gypsum), per ton | 18.00 |
| Chico and Bridgeport, Tex.—Hen | ¶9.00 |
| Baby chick, per ton | ¶8.00 |
| Danbury, Conn.—(Limestone), bulk | 6.00@ 7.00 |
| Easton, Penn.—Per ton, bulk | 3.00 |
| Joliet, Ill.—(Limestone), bags, per ton | 4.50 |
| Knoxville, Tenn.—Per bag | 1.25 |
| Los Angeles, Calif.—(Feldspar), per ton | 15.00 |
| Gypsum, Ohio—(Gypsum), per ton | 10.00 |
| Hartford, Conn. | ‡7.50@*9.00 |
| Limestone, Wash. — (Limestone), per ton | 12.50 |
| Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag | .50 |
| Middlebury, Vt.—Per ton | 10.00 |
| Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk | 5.00 |
| Seattle, Wash.—(Limestone), bulk, per ton | 10.00 |
| Warren, N. H.—(Mica), per ton | 3.85@ 3.90 |
| Waukesha, Wis.—(Limestone), per ton | 8.00 |
| West Stockbridge, Mass.—(Limestone), bulk | ‡7.50@*9.00 |
| Wisconsin Points—(Limestone), per ton | 9.00 |

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

## Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

| | |
|---|---|
| Albany, Ga. | 12.00 |
| Anaheim, Calif. | 10.50@11.00 |
| Barton, Wis. | 10.50 |
| Boston, Mass. | 17.00* |
| Brighton, N. Y. | 19.75* |
| Brownstone, Penn. | 11.00 |
| Dayton, Ohio | 12.50@13.50 |
| Detroit, Mich. | 16.00* |
| Farmington, Conn. | 13.00 |
| Flint, Mich. | ¶12.00@17.50* |
| Grand Rapids, Mich. | 12.50 |
| Hartford, Conn. | 14.00@19.00* |
| Jackson, Mich. | 12.25 |
| Lakeland, Fla. | 10.00@11.00 |
| Lake Helen, Fla. | 9.00@12.00 |
| Lancaster, N. Y. | 12.50 |
| Madison, Wis. | 12.50a |
| Michigan City, Ind. | 11.00 |
| Milwaukee, Wis. | 13.00* |
| Minneapolis and St. Paul, Minn. | 10.00 |
| Minnesota Transfer | 10.00 |
| New Brighton, Minn. | 10.00 |
| Pontiac, Mich. | 16.00@17.00 |
| Portage, Wis. | 16.00 |
| Prairie du Chien, Wis. | 18.00@22.50 |
| Rochester, N. Y. | 19.75* |
| Saginaw, Mich. | 13.50 |
| San Antonio, Texas | 16.00 |
| Sebewaing, Mich. | 12.00 |
| Sioux Falls, S. Dak. | 13.00 |
| South River, N. J. | 13.00 |
| Syracuse, N. Y. | 18.00@20.00 |
| Toronto, Canada | 16.00*† |
| Wilkinson, Fla. | 12.00@16.00 |
| Winnipeg, Canada | 14.00 |

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M., 10 days.

## Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

| | Per Bag | Per Bbl. |
|---|---|---|
| Albuquerque, N. M. | .84¼ | 3.37 |
| Atlanta, Ga. | ........ | 2.35 |
| Baltimore, Md. | ........ | 2.15@2.25 |
| Birmingham, Ala. | ........ | 2.30 |
| Boston, Mass. | ........ | 2.13@2.23 |
| Buffalo, N. Y. | ........ | 2.20@2.30 |
| Butte, Mont. | .90¼ | 3.61 |
| Cedar Rapids, Iowa | ........ | 2.24 |
| Charleston, S. C. | ........ | 2.35 |
| Cheyenne, Wyo. | .82¾ | 3.31 |
| Cincinnati, Ohio | .58 | 2.32 |
| Cleveland, Ohio | ........ | 2.24 |
| Chicago, Ill. | .51¼ | 2.05 |
| Columbus, Ohio | .57¼ | 2.29 |
| Concrete, Wash. | ........ | 2.35 |
| Dallas, Texas | ........ | 2.00 |
| Davenport, Calif. | ........ | 2.45* |
| Davenport, Iowa | ........ | 2.24 |
| Dayton, Ohio | .58¼ | 2.33 |
| Denver, Colo. | .66¼ | 2.65 |
| Des Moines, Iowa | ........ | 2.05 |
| Detroit, Mich. | ........ | 2.00 |
| Duluth, Minn. | ........ | 2.04 |
| Houston, Texas | ........ | 2.00 |
| Indianapolis, Ind. | .54¾ | 2.19 |
| Jackson, Miss. | ........ | 2.30 |
| Jacksonville, Fla. | ........ | 2.20 |
| Jersey City, N. J. | ........ | 2.03@2.13 |
| Kansas City, Mo. | ........ | 1.92 |
| Los Angeles, Calif. | .60 | 2.40 |
| Louisville, Ky. | .55½ | 2.22 |
| Memphis, Tenn. | ........ | 2.30 |
| Milwaukee, Wis. | ........ | 2.00@2.20 |
| Minneapolis, Minn. | ........ | 2.12@2.22 |
| Montreal, Que. | ........ | 1.36 |
| New Orleans, La. | ........ | 2.20 |
| New York, N. Y. | ........ | 1.93@2.03 |
| Norfolk, Va. | ........ | 2.07 |
| Oklahoma City, Okla. | ........ | 2.46 |
| Omaha, Neb. | ........ | 2.36 |
| Peoria, Ill. | ........ | 2.22 |
| Philadelphia, Penn. | ........ | 2.11@2.21 |
| Phoenix, Ariz. | .76½ | 3.06 |
| Pittsburgh, Penn. | ........ | 2.04 |
| Portland, Colo. | ........ | 2.80 |
| Portland, Ore. | ........ | 2.60‡ |
| Reno, Nev. | ........ | 2.91 |
| Richmond, Va. | ........ | 2.24@2.34 |
| Salt Lake City, Utah | .70¼ | 2.81 |
| San Francisco, Calif. | ........ | 2.21 |
| Savannah, Ga. | ........ | 2.50 |
| St. Louis, Mo. | .51¼ | 2.05 |
| St. Paul, Minn. | ........ | 2.12@2.22 |
| Seattle, Wash. | ........ | 2.50@2.65† |
| Tampa, Fla. | ........ | 2.25 |
| Toledo, Ohio | ........ | 2.20 |
| Topeka, Kan. | ........ | 2.41 |
| Tulsa, Okla. | ........ | 2.33 |
| Wheeling, W. Va. | ........ | 2.12 |
| Winston-Salem, N. C. | ........ | 2.59 |

NOTE—Add 40c per bbl. for bags.
*Includes sacks.
†10% discount, 10 days. ‡10% discount, 15 days.

Mill prices f.o.b. in carload lots, without bags, to contractors.

| | Per Bag | Per Bbl. |
|---|---|---|
| Albany, N. Y. | .43¾ | 1.75 |
| Buffington, Ind. | ........ | 1.80 |
| Chattanooga, Tenn. | ........ | 2.45* |
| Concrete, Wash. | ........ | 2.35 |
| Davenport, Calif. | ........ | 2.35 |
| Detroit, Mich. | ........ | 2.15 |
| Hannibal, Mo. | ........ | 1.90 |
| Hudson, N. Y. | ........ | 1.75 |
| Leeds, Ala. | ........ | 1.65 |
| Lime and Oswego, Ore. | ........ | 2.70‡ |
| Mildred, Kan. | ........ | 2.35 |
| Nazareth, Penn. | ........ | 2.15 |
| Northampton, Penn. | ........ | 1.75 |
| Richard City, Tenn. | ........ | 2.05 |
| Steelton, Minn. | ........ | 1.85 |
| Toledo, Ohio | ........ | 2.20 |
| Universal, Penn. | ........ | 1.80 |

*Including sacks at 10c each.

## Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

| | Crushed Rock | Ground Gypsum | Agricultural Gypsum | Stucco Calcined Gypsum | Cement and Gauging Plaster | Wood Fiber | Gauging White | Plaster Sanded | Cement Keene's | Finish Trowel | —Plaster Board— ¼x32x36". Per M Sq. Ft. | ⅜x32x36". Per M Sq. Ft. | Wallboard, ⅜x32 or 48". Lengths 6'-10'. Per M Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arden, Nev., and Los Angeles, Calif. | 3.00 | 8.00u | 8.00u | 10.70u | 10.70u | ........ | ........ | ........ | ........ | 11.70u | ........ | ........ | ........ |
| Centerville, Iowa | 3.00 | 10.00 | 15.00 | 10.00 | 10.00 | 10.50 | 13.50 | ........ | ........ | 13.50 | ........ | ........ | ........ |
| Des Moines, Iowa | 3.00 | 8.00 | 9.00 | 10.00 | 10.00 | 10.50 | 13.50 | 12.00 | 24.00 | 22.00 | 18.00 | 21.00 | 30.00 |
| Detroit, Mich. | ........ | ........ | ........ | ........ | 14.30o | 12.30m | ........ | m9.00@11.00o | ........ | ........ | ........ | ........ | ........ |
| Delawanna, N. J. | ........ | ........ | ........ | ........ | ........ | 8.00 | ........ | 9.00 | ........ | ........ | .14½ | .15½ | 30.00 |
| Douglas, Ariz. | ........ | ........ | 6.00 | ........ | ........ | ........ | 15.00 | ........ | 40.00 | 13.50 | 35.00 | 45.00 | ........ |
| Grand Rapids, Mich. | 2.75 | 6.00 | 6.00 | 8.00 | 9.00 | 9.00 | 17.50 | ........ | 24.55 | 20.00 | ........ | ........ | ........ |
| Gypsum, Ohio | 3.00 | 4.00 | 6.00 | 8.00 | 9.00 | 9.00 | 19.00 | 7.00 | 27.50 | 19.00 | ........ | 15.00 | 30.00 |
| Los Angeles, Calif. | ........ | ........ | 7.50@9.50 | 11.50y | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Port Clinton, Ohio | 3.00 | 4.00 | 6.00 | 10.00 | 9.00 | 9.00 | 21.00 | 7.00 | 30.15 | 20.00 | ........ | 20.00 | 30.00 |
| Portland, Colo. | ........ | ........ | ........ | 10.00 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| San Francisco, Calif. | ........ | ........ | 9.00 | 13.40 | 14.40 | ........ | 15.40 | ........ | ........ | ........ | ........ | ........ | ........ |
| Seattle, Wash. | 6.00 | 10.00 | 10.00 | 13.00 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| Sigurd, Utah | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | 21.50 | ........ | ........ | ........ | ........ |
| Winnipeg, Man. | 5.00 | 5.00 | 7.00 | 13.00 | 14.00 | 14.00 | ........ | ........ | ........ | ........ | 20.00 | 25.00 | 33.00 |

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
(m) Includes paper bags; (o) includes jute sacks; (u) includes sacks; (y) sacks 15c extra, rebated.

# Market Prices of Cement Products

## Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

| City or shipping point | 8x8x16 | 8x10x16 | 8x12x16 |
|---|---|---|---|
| Camden, N. J. | 17.00 | | |
| Cement City, Mich. | | 5x8x12—55.00¶ | |
| Columbus, Ohio | 17.00c@19.00a | | |
| Detroit, Mich. | .16 | | .18 |
| Forest Park, Ill. | 21.00* | | |
| Grand Rapids, Mich. | 15.00@16.00a | | |
| Graettinger, Iowa | .18@ .20 | | |
| Indianapolis, Ind | .13@ .15† | | |
| Los Angeles, Calif.¶ | 5¾x3½x12—55.00 | 7¾x3½x12—65.00 | |
| Oak Park, Ill. | 20.00 | | |
| Olivia and Mankato, Minn. | 9.50b | | |
| Somerset, Penn. | .20@ .25 | | |
| Tiskilwa, Ill. | .16@ .18† | | |
| Yakima, Wash. | 20.00* | | |

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain.

## Cement Roofing Tile

Prices are net per sq. in. carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

| | |
|---|---|
| Red | 15.00 |
| Green | 18.00 |
| Chicago, Ill.—Per sq. | 20.00 |

Cicero, Ill.—Hawthorne roofing tile, per sq.

| | Chocolate, Red, Yellow, Gray, and Orange | Green, Blue |
|---|---|---|
| French and Spanish† | $11.50 | $13.50 |
| Ridges (each) | .25 | .35 |
| Hips | .25 | .35 |
| Hip starters | .50 | .60 |
| Hip terminals, 2-way | 1.25 | 1.50 |
| Hip terminals, 4-way | 4.00 | 5.00 |
| Mansard terminals | 2.50 | 3.00 |
| Gable finials | 1.25 | 1.50 |
| Gable starters | .25 | .35 |
| Gable finishers | .25 | .35 |
| *End bands | .25 | .35 |
| *Eave closers | .06 | .08 |
| *Ridge closers | .05 | .06 |

*Used only with Spanish tile.
†Price per square.

Houston, Texas—Roofing Tile, per sq. 25.00

| Indianapolis, Ind.—9x15-in. | Per sq. |
|---|---|
| Gray | 10.00 |
| Red | 11.00 |
| Green | 13.00 |
| Waco, Texas: | Per sq. |
| 4x4 | .60 |

| | |
|---|---|
| Longview, Wash.: (Stone-Tile) | Per 1000 |
| 4x6x12 | 55.00 |
| 4x8x12 | 64.00 |
| Mt. Pleasant, N. Y.: | Per 1000 |
| 5x8x12 | 78.00 |
| Grand Rapids, Mich.: | Per 100 |
| 5x8x12 | 7.00 |
| Houston, Texas: | |
| 5x8x12 (Lightweight) | 80.00 |
| Pasadena, Calif. (Stone Tile): | Per 100 |
| 3½x4x12 | 3.00 |
| 3½x6x12 | 4.00 |
| 3½x8x12 | 5.50 |
| Tiskilwa, Ill.: | Per 100 |
| 8x8 | 15.00 |
| Wildasin Spur, Los Angeles, Calif. (Stone-Tile): | Per 1000 |
| 3½x6x12 | 50.00 |
| 3½x8x12 | 60.00 |
| Prairie du Chien, Wis.: | |
| 5x8x12 | 82.00 |
| 5x4x12 | 46.00 |
| 5x8x 6 (half-tile) | 41.00 |
| 5x8x10 (fractional) | 82.00 |
| Yakima, Wash. (Building Tile): | |
| 5x8x12 | .10 |

## Cement Building Tile

| Cement City, Mich.: | Per 100 |
|---|---|
| 5x8x12 | 5.00 |
| Grand Rapids, Mich.: | |
| 5x8x12 | 8.00 |
| 5x4x12 | 4.50 |

## Cement Drain Tile

| | |
|---|---|
| Graettinger, Iowa—5 to 36 in., per ton | 8.00 |
| Olivia and Mankato, Minn.—Cement drain tile, per ton | 8.00 |
| Tacoma, Wash.—Drain tile, per ft.: | |
| 3 in. | .04 |
| 4 in. | .05½ |
| 6 in. | .07½ |
| 8 in. | .10 |
| Waukesha, Wis.—Drain tile, per ton | 8.00 |

## Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

| | Common | Face |
|---|---|---|
| Appleton, Minn. | 22.00 | 25.00@40.00 |
| Baltimore, Md. (Del. according to quantity) | 15.50 | 22.00@50.00 |
| Camden and Trenton, N. J. | 17.00 | |
| Ensley, Ala. ("Slagtex") | 14.50 | 22.50@33.50 |
| Eugene, Ore. | 25.00 | 35.00@75.00 |
| Forest Park, Ill. | | 37.00 |
| Friesland, Wis. | 22.00 | 32.00 |
| Longview, Wash.* | 15.00 | 22.50@65.00 |
| Milwaukee, Wis. | 15.00 | 20.00@50.00 |
| Mt. Pleasant, N. Y. | | 14.00@23.00 |
| Oak Park, Ill. | | 42.00 |
| Omaha, Neb. | 18.00 | 30.00@ 40.00 |
| Pasadena, Calif. | 10.00 | |
| Philadelphia, Penn. | 14.75 | 20.00 |
| Portland, Ore. | 17.50 | 23.00@55.00 |
| Mantel brick—100.00@150.00 | | |
| Prairie du Chien, Wis. | 14.00 | 22.50@ 25.00 |
| Rapid City, S. D. | 17.00 | 25.00@ 40.00 |
| Waco, Texas | 16.50 | 32.50@125.00 |
| Watertown, N. Y. | 20.00 | 35.00 |
| Westmoreland Wharves, Penn. | 14.75 | 20.00 |
| Winnipeg, Man. | 14.00 | 22.00 |
| Yakima, Wash. | 22.50 | |

*40% off List.

## Market Comment

THE rock products market shows practically no fluctuation of prices during the past two weeks, according to reports from representative producers all over the United States. Apparently no seasonal changes in prices have been forthcoming yet and sand and gravel shows only slight variations. Portland cement, cement products, lime and gypsum remain the same.

## Recent Contract Prices

**Hiawatha, Kan.** Road project to use 38,000 tons of gravel at 80 cents per ton, f.o.b. pits at Blue Rapids plus 5½ cents per hundred for freight.

**Republic County, Kan.** Contract let to W. P. Shivers, Scandia, Kan., for 9½ miles sand or gravel road. Section No. 1, 2½ miles near Belleville, was let for local material at a contract price of $1.50 per yd. for material and 20 cents per yd.-mile haul. Section No. 2, 2½ miles, was let for Fairbury pit run gravel at $1.93 per yd. for material and 20 cents per yd.-mile haul. Section No. 3, 2½ miles, was let under the Nebraska road surfacing specifications, material from Fairbury at a contract price of $1.93 per yd. for material and 17 cents yd.-haul. Section No. 4, 2½ miles near Scandia, was let for river material at a contract unit price of $1.25 per yd. for material and 20 cents per yd.-mile haul.

**Dubuque, Iowa.** Agricultural limestone quoted at 90 cents per ton, f.o.b. quarry.

**Portland, Ore.** Wood, Baxter & Co. awarded contract for two carloads of hydrated lime at $21 per ton, delivered to municipal terminal No. 4.

## Canadian Sand-Lime Brick Production in 1926

PRODUCTION of sand-lime brick in Canada in 1926 amounted to 50,282,000, with a value of $606,409, as compared with 68,869,000, worth $854,055, in the previous year. Ten plants with a capitalization of $1,082,577 engaged in the industry.

Cost of materials used in the process of manufacture amounted to $197,400 as compared with $130,555 in the previous year. Other products of the plants, including hollow building blocks totaled $23,263.

## Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

| Culvert and Sewer | 4 in. | 6 in. | 8 in. | 10 in. | 12 in. | 15 in. | 18 in. | 20 in. | 22 in. | 24 in. | 27 in. | 30 in. | 36 in. | 42 in. | 48 in. | 54 in. | 60 in. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detroit, Mich. | 15.00 per ton | | | | | | | | | | | | | | | | |
| Graettinger, Iowa | .04½d | .05½ | .08½ | .12½ | .17½ | | .40 | .50 | .60 | .70 | | | | | | | |
| Grand Rapids, Mich. (b) | | | | | | | | | | | | | | | | | |
| Culvert pipe | | | | .60 | .72 | 1.00 | 1.28 | 1.60† | | 1.92 | 2.32 | 3.00 | 4.00 | 5.00 | 6.00 | | |
| Sewer pipe (d) | | | | | | .63 | | .60† | | | | .58 | | | | | |
| Houston, Texas | | .19 | .28 | .43 | .55½ | .90 | 1.30 | | 1.70† | 2.20 | | | | | | | |
| Indianapolis, Ind. (a) | | | | .80 | .90 | 1.10 | 1.30 | | | 1.70 | | 2.70 | | | | | |
| Longview, Wash. | Sewer pipe 40% off list; culvert—list | | | | | | | | | | | | | | | | |
| Mankato, Minn. (b) | | | | | | | | | | 1.50 | 1.75 | 2.50 | 3.25 | 4.25 | | | |
| Newark, N. J. | 6 in. to 24 in., $18.00 per ton | | | | | | | | | | | | | | | | |
| Norfolk, Neb. (b) | | | | .90 | 1.00 | 1.13 | 1.42 | | | 2.11 | | 2.75 | 3.58 | | 6.14 | | 7.78 |
| Olivia, Mankato, Minn. | 12.00 per ton | | | | | | | | | | | | | | | | |
| Paullina, Iowa‡ | | | | | | | | 2.25 | | 2.11 | | 2.75 | 3.58 | | 6.14 | | 7.78 |
| Somerset, Penn. | | | | | 1.08 | 1.25 | 1.65 | | | 2.50 | | 3.65 | 4.85 | 7.50 | 8.50 | | |
| Tiskilwa, Ill. (rein.) (a) | | | | .65 | .75 | .85 | .75 | | | | | | | | | | |
| Wahoo, Neb. (b) | | | | | 1.00 | 1.13 | 1.10 | 1.60 | | 1.90 | | 2.25 | 3.40 | | 5.50 | | |
| Yakima, Wash. | | | | | | | 1.42 | | | 2.11 | | 2.75 | 3.58 | 4.62 | 6.14 | 6.96 | 7.78 |
| Tacoma, Wash. | .15 | .18 | .25 | .38 | .45 | .60 | $10.00 per ton | | | | | | | | | | |

(a) 24-in. lengths; (b) Reinforced; (d) Eastern clay, list, 72% and 60% off.
†21-in. diam. ‡Price per 2-ft. length.

# Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

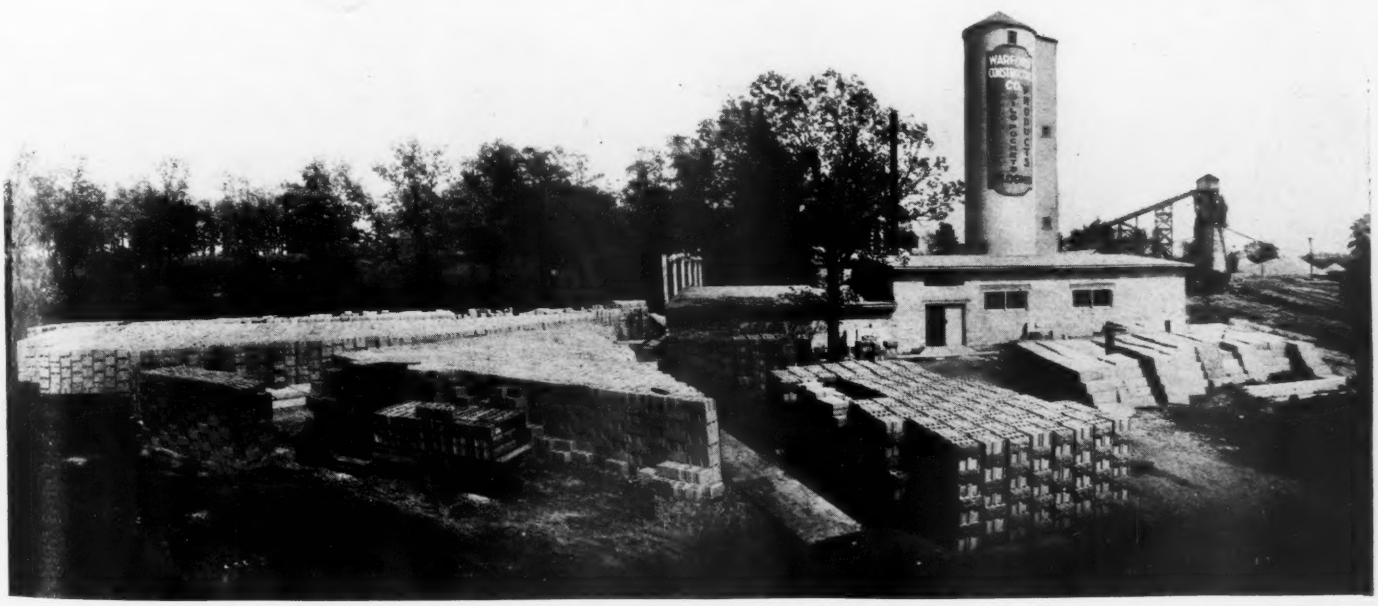
# Plant Location as a Factor in the Success of a Cement Products Business

## Warford Construction Co. Demonstrates the Advertising Value of Using the Right Material

WHEN a new company enters the field of cement products manufacturing and makes a very careful survey of all conditions before locating its factory, it is certain that the plant will be placed where it has the best possible facilities for producing and distributing its products. Just such a survey was made by the Warford Construction Co. of North Aurora, Ill., and the result should be of interest to material producers generally, since the Warford company arrived at the conclusion that one of the most important items in locating the plant was to be close to sufficient material of a known standard of quality. Besides the advantage of proximity to the material, the company also was located with good transportation facilities, both road and rail, and the market was equally convenient, since North Aurora is adjacent to Aurora, a community of 30,000, and is also only 30 miles from Chicago. The plant was completed in January, 1926, and already additional machinery is a necessity and is now being installed, indicating that the decision to place the plant in its present location was sound.

### Planned Location

The Warford plant is situated next to one of the gravel plants of the H. D. Conkey Co., sand and gravel producers and manufacturers of gravel machinery, and from that company all the sand and pebbles used in the concrete block and other products are obtained. The Warford company thus can get washed and graded gravel of known quality at a minimum expense. H. R. Webb, superintendent of the products plant, pointed out the four chief advantages of this proximity as being (1) no freight charges,

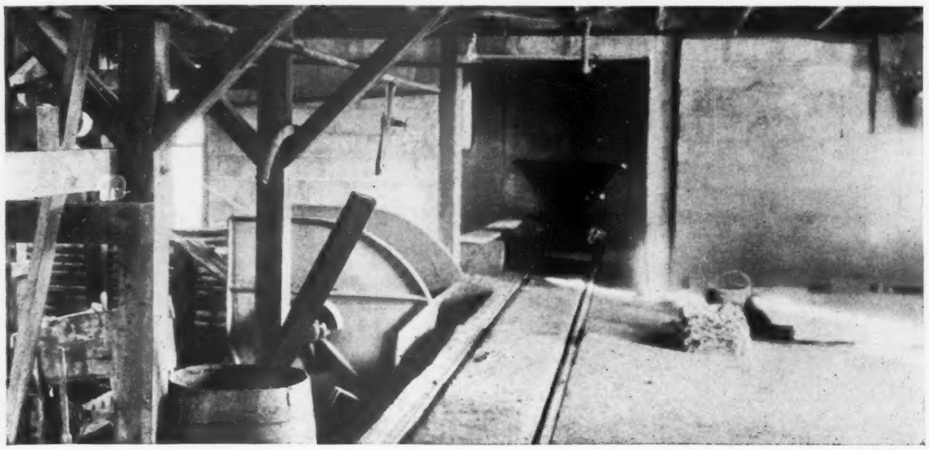


*Cement products plant and storage yard of the Warford Construction Co., North Aurora, Ill. The gravel plant of H. D. Conkey Co. shows in the background at the right*

(2) quick delivery, (3) inexpensive yard switching, and (4) no frozen material in winter due to several days' exposure while being shipped.

### *Handling the Material*

All of the aggregate material for the plant, whether it be sand and gravel from the Conkey company, crushed stone, or four vertical bins, each running from the top nearly to the bottom, and each being a quarter circle in cross-section. From the hopper under the track the material is brought to the foot of the silo by a Gifford-Wood reciprocating feeder, and there it is taken by a Gifford-Wood bucket elevator with 5x8-in. buckets and raised to the top of the bins. A 7½-hp. motor is used to



***Showing layout of material track, with car under bins, and 14-ft. mixer to left of track***

ground shale, is brought in hopper cars to the company's stub track (a spur from the C. B. & Q. R. R.) and unloaded into a hopper beneath the track. The track runs beside the main plant and the hopper is opposite a large monolithic concrete silo having a capacity of 6 carloads, in which the material is stored. The silo is divided into

***Automatic stripper and conveyor from mixer***

operate the feeder and elevator. With this arrangement it is possible to unload a 60-ton carload of material in about three hours.

One of the bins is used for sand and another for pebbles. A third is used for ground low-carbon shale, known as haydite. The last bin holds crushed limestone screening or haydite, but the latter is placed in it only when no blocks using limestone aggregate are being made. The shale is obtained from the Western Brick Co., Danville, Ill., and the limestone screenings are from the quarry of Dolese & Shepard at McCook, Ill.

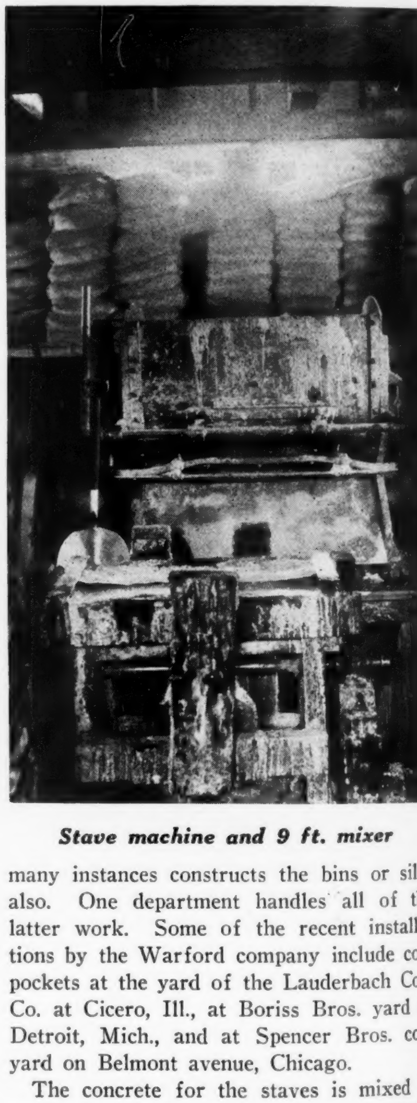
There is a small track leading from the room underneath the bins at the base of the silo out to the large room in which are the mixers and strippers. Gates in the bottom of the bins and directly above the track allow the material to flow into the material car on the track, which carries it to points opposite either of the two mixers. Since the room at the base of the silo and that portion of the large room in which the track is located are 3 or 4 ft. higher than the balance of the room, it is easy to dump the material directly into the mixers from the car. The raised part of the large room is also used for storage space for cement.

### *Block Machinery*

The main unit in the Warford plant is a Universal face-down block machine. The material for this machine is mixed in an Ideal 14-ft. mixer and from the mixer it flows onto a bucket elevator in a small pit below the mixer and is carried up to the stripper. Power for the mixer and the stripper is provided by a 5-hp. Western Electric motor. In a nine-hour day 2500 block can be turned out by this machine. The block are 8x8x16 in., 8x10x16 in. and 8x12x16 in. The demand for the company's product has so increased that a new stripper is being installed at the present time. The new machine is made by the Anchor Concrete Machinery Co., Adrian, Mich., and when it is in operation it is expected that the plant will have a capacity of 4000 block in a nine-hour day. Both the old and the new machine are of the dry-tamping type.

### *Concrete Staves for Large Bins*

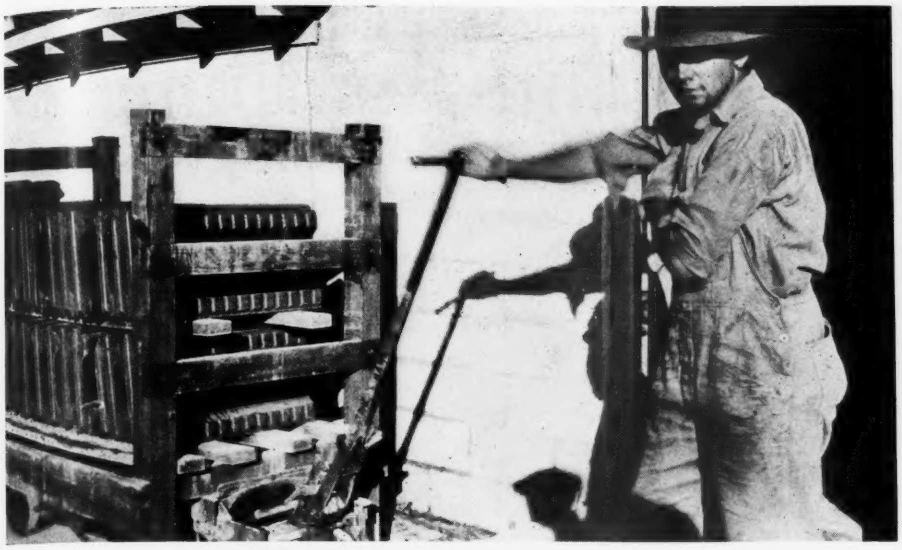
The particular specialty of the Warford company, however, is not block, but concrete coal pocket staves. These are double-rib, key-lock staves, 12x24 in. in size, which are used in circular bins, coal pockets, silos and similar construction. These structures generally are 15 to 20 ft. in diameter and may be 50 ft. tall in some cases. The company not only makes these staves but in



***Stave machine and 9 ft. mixer***

many instances constructs the bins or silos also. One department handles all of the latter work. Some of the recent installations by the Warford company include coal pockets at the yard of the Lauderbach Coal Co. at Cicero, Ill., at Boriss Bros. yard in Detroit, Mich., and at Spencer Bros. coal yard on Belmont avenue, Chicago.

The concrete for the staves is mixed in an Ideal 9-foot mixer, and removed by shovel to a vibrating machine on which the staves are made. This vibrating machine is an ingenious arrangement made right at the plant, consisting of only a frame of 2x4-in. pieces to which can be clamped one of the steel forms in which the staves are made. An eccentric driven by a 5-hp. Western Electric motor vibrates the upper portion



*Dolly with key-lock coal-pocket staves*

of the frame to which the form is attached, and apparently tamps the concrete as well as could be done by hand. The same motor also drives the mixer. Five hundred staves can be turned out from this vibrator in a day. The mix used on the staves and also on the block may vary slightly according to the condition of the aggregate, but generally a batch runs about one sack of cement to 1 cu. ft. of stone or haydite and 8 cu. ft. of sand and pebbles.

#### *Curing the Block*

As the forms are removed from the blocks and the staves they are placed on simple wooden dollies which when loaded are taken to the steam rooms by Barret-Craven Co. jack cars. These Barret-Craven jacks are used all around the plant for transporting block to kilns, storage yards, shipping platform, etc., and are found to be remarkably successful, since they allow more freedom of transportation than does a car running on a track.

There are five steam rooms, each 50 ft. long and 8 ft. wide. Wooden doors are used to close both the inner and outer ends of these rooms. Both live steam and dry steam is admitted to the kilns while the block is curing, but the familiar method of using standing heated water into which steam is forced is not used by the Warford company at all. Mr. Webb believes it is entirely unnecessary when live steam is used, since the steam supplies sufficient moisture. A Kewanee portable firebox boiler furnishes the steam for the curing rooms and also heats the entire plant. Both the block and staves are allowed to remain in the steam room on an average of 12 hours.

#### *Distribution and Advertising*

All of the coal pocket staves are shipped out from the plant, but only 25% of the block are shipped. The balance of the block are trucked out, the Warford company contracting for the trucks.

In advertising its products the company makes particular mention of its good grade of aggregates. All the material is washed and graded, and this fact is stressed, the company pointing out the fact that aggregate, free from impurities and scientifically graded in the mix, is sure to produce a superior product. W. H. Warford is president of the company, W. H. Towne is vice-president, and R. C. Cook is secretary and treasurer. H. R. Webb is superintendent.

## Oregon Gravel and Concrete Products Co. Will Enlarge Facilities

THE Medford Concrete and Construction Co., which began operations in Medford, Ore., 16 years ago, have announced extensive plans for the relocation and enlargement of their plant to facilitate the increased demand for their products in this district.

All of the present plant, except that portion used in the manufacure of sewer pipe, will be moved to a location outside the corporate limits as soon as a lease has been executed.

Plans for the enlargement and improvement of the company's operations call for the installation of modern machinery to supply sand and gravel for the building trade and all grades of crushed rock for paving and road building. It is also planned to remodel the sewer pipe plant, which will remain at the present location on North Riverside. C. J. Semon, Russell Semon and H. H. Pringle are the directing heads of the company.—*Medford* (Ore.) *News.*

## Invents New Process for Making Glazed Concrete Brick

W. C. JOURDON of Parsons, Kans., has invented a process and machine which he claims will make successfully glazed concrete brick at a lower cost than clay brick.

One of the principle operations in the manufacture of bricks in the machine is a continuous vibration to settle the concrete which is poured into molds. Various colors may be mixed in the concrete and the molded brick glazed to make the finished product attractive.

The first machine built will be operated by J. W. Prince, D. E. Minton and H. A. Medaris, who have formed a partnership and purchased exclusive rights for manufacturing the brick in 25 eastern Kansas counties.

Mr. Jourdan holds all patent rights on the machine and process, and if present plans materialize will construct a factory, made of the new brick, to manufacture the machines.—*Parsons* (Kans.) *Sun.*

## Concrete Signs in England

CONCRETE signs for road crossings and other places are now being largely adopted. In the manufacture of these a 1:3 mixture of cement and gravel or cement and marble aggregate is used. When casting a white and black sign a white concrete mixture of one part of white cement and three parts of marble aggregate graded from 0 to ⅜ in. is used. In making the black letters on all the concrete signs a mixture of one part of black portland cement with three parts of copper slag is used. The black portland cement is produced by adding to the standard portland cement not more than 10% by weight of black coloring pigment. On all cautionary signs where a yellow background is specified, the mixture is one part of yellow cement to three parts of marble aggregate. The resulting shade of yellow to conform with the specifications of a dominant wave length in millimicrons of not less than 580 or more than 588, purity not less than 80%, integral reflection of pigment not less than 35%. These values are determined by the reflection of white light from the pigment.—*London Contract Journal.*

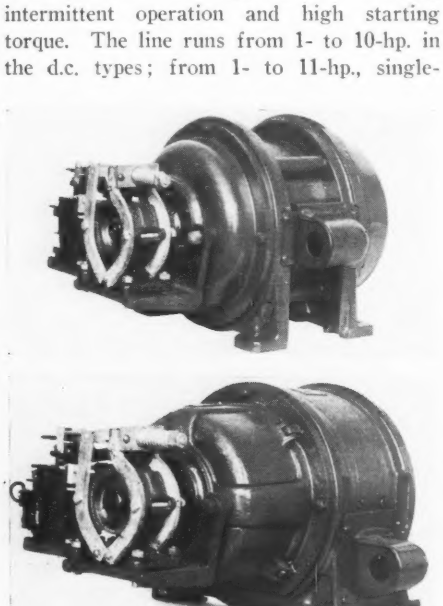
## British Tests on Effect of Pigments in Concrete

A REPORT of the results of investigations made by the British Portland Cement Association to determine the effect of mineral pigments on the strength of concrete is given in the *Contract Journal.* The tests were made with briquettes and cubes of ordinary portland cement and also with rapid hardening portland cement, using a 3:1 mix with standard Leighton Buzzard testing sand. Varying percentages of the different pigments were used. The results showed that the presence of red oxide gave no appreciable difference in the strength in both compression and tension. Ultramarine blue showed some decrease in strength, and the other pigments showed decreasing strength in the following order: green chromium oxide, yellow ochre, black manganese dioxide, marigold, and carbon black. The last named gave a very definite decrease, which became more marked as the per cent of pigment was increased.

# New Machinery and Equipment

## New Totally Enclosed Motors for Portable Hoists

GENERAL ELECTRIC CO., Schenectady, N. Y., announces a new line of motors for portable electric hoists and suitable also for other applications involving intermittent operation and high starting torque. The line runs from 1- to 10-hp. in the d.c. types; from 1- to 11-hp., single-



*New portable hoist motors. Above—3-phase, a. c. type and below—end view of d. c. type*

speed, 3 and 2 phase, and from 1- to 5-hp., single phase, in the a.c. types. Three- and two-phase, slip-ring type hoist motors are also included from 3-hp. up.

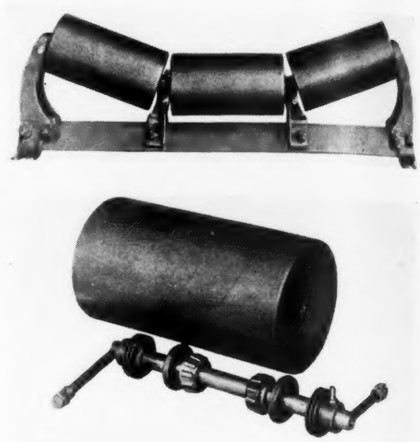
The new motors are totally enclosed and all parts are well protected. Bearings are of the waste-packed, sleeve type, being closed against the entrance of dirt from the outside. The direct-current motors are series wound. The a.c. motors of the polyphase type have high-resistance rotors, while the single-phase motors have high starting torque.

In a great many of the applications of these motors a brake is required. Accordingly the motors are all built with the shaft extension away from the drive to take a brake, and the motor end-shield at this end is fitted with pads or bosses with drilled and tapped holes for mounting the brake.

## New Belt Conveyor Carrier

THE STEPHENS-ADAMSON MANUFACTURING CO., Aurora, Ill., has recently placed on the market a new type of belt conveyor carrier which is said to embody several improvements both in construction and design. The new carrier is known as the Stephens-Adamson "Simplex" carrier, the complete line including carriers for belts ranging in width from 12 to 60 in. The carrier proper consists of three rollers in line, the troughing rollers being mounted at a 20 deg. angle so as to increase the capacity of the belt, the manufacturers say. The carriers are mounted on a heavy steel angle section base of the self-cleaning type. The whole assembly is tilted slightly in the direction of belt travel, in order to facilitate the proper training of the belt.

The rollers are self-contained units, of



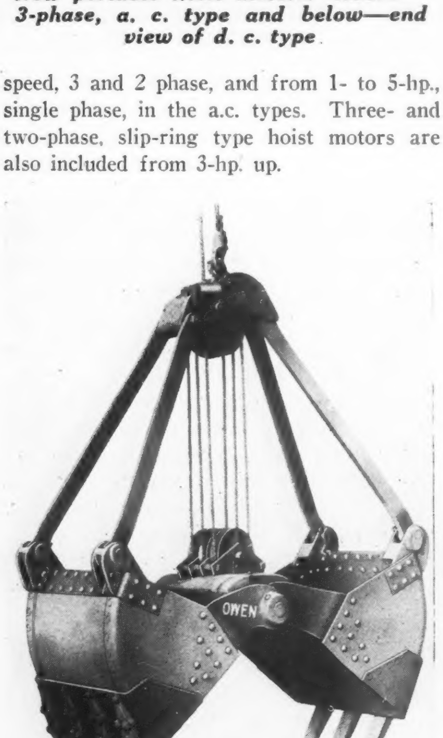
*New three-roller conveyor troughing unit*

simple, strong construction. They are made of steel tubing, and are furnished with drawn steel end plates. The ends of the rollers are rounded to protect the belt from fraying, or wear. Each roller is equipped with two Timken Bearings. The permanent adjustment of the bearings is provided for by lock screws.

The rollers proper are mounted on malleable iron stands, which support the shafts close to the bearings, and have large, flaring caps. The stands which support the outer ends of the troughing rollers can be swung out of the way to remove the roller bodily. This gives access to the center roller from either side.

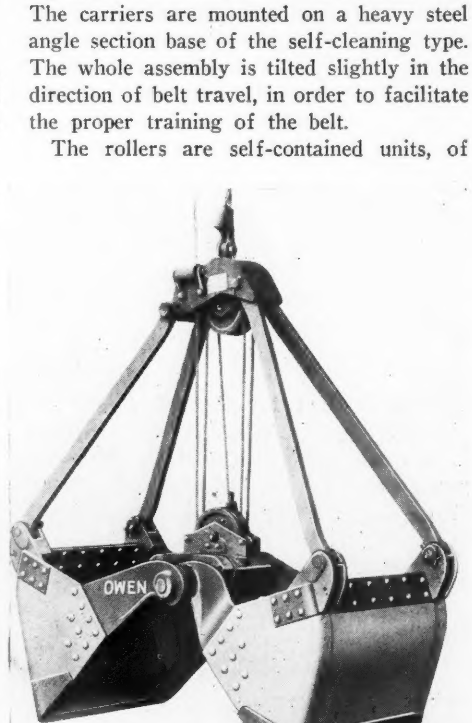
Lubrication of the rollers is of the high pressure grease variety, each roller shaft being equipped with pressure fittings.

All the parts of the carriers, such as bearings, shafts, rollers, brackets, and complete roller assemblies are mutually interchangeable for belts of the same size.





*New type of excavating bucket*





*New clamshell for rehandling*

## Two New Clamshell Buckets

THE OWEN BUCKET CO., Cleveland, Ohio, announce two new models, Type "M," a digging bucket, and Type "K," a rehandling bucket. Though both of these new types follow the general principles of design and construction of their other and earlier products, many details are said to be improved upon.

Some of the changes and improvements incorporated in the design, according to the manufacturers, are a new design of crosshead in one piece having fewer parts than previous types of Owen buckets; provision for complete protection and lubrication of the main or center shaft bearings; heavy lips of alloy steel extending up the side plates of

the bucket past the wearing point; improved arm brackets and a smooth contour for the inside of the shell without undue thickness of angles at the corners of the cutting edges.

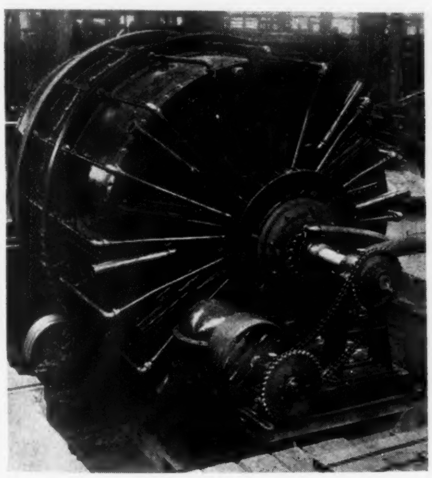
The Type "M" bucket is primarily a digger, designed for excavating and general purpose work. It is made in three models, namely, Type "M" standard, special, and narrow. The narrow or standard Type "M" buckets when equipped with special arm bracket construction are known as the Type "M" Special.

The rehandler, known as the Type "K," is a lighter weight bucket designed particularly for rehandling of materials. It is also made in three models, called the Standard Type "K," the Special, and the Hi-Speed. The Type "K" Hi-Speed, which is illustrated here, has a different shell with sharp pitch to the bottom plates for rehandling of loose materials. Both the Standard and Hi-Speed models can be furnished with special lubricated bearings, and when so equipped are known as the Type "K" Special.

These two types of buckets replace older types manufactured by the Owens company.

## New Type of Vacuum Filter

A NEW type of continuous vacuum filter, to be known as the Dorrco filter, has been introduced by the Dorr Co. of New York. Several new features are said to be incorporated in this filter which give it a relatively wider field of application; it is being

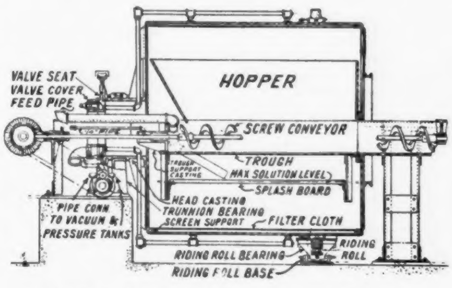


*New type of continuous vacuum filter*

specially adapted for filtering cement slurry, the manufacturers say.

The filter medium is applied on the inside of the drum and the division of the total filter medium into several sections or panels makes it possible to change all of the cloth or any panel of it by removing the wood strips which secure the medium to the drum. Vacuum for cake formation, drying and washing, and air for cake discharge are applied to the panels through a port valve of the usual type adjacent to the closed end of the drum. All piping is located on the outside of the drum and is accessible.

The drum at its open end is provided with an internal flange which serves to retain the pulp within it during filtration, thus eliminating the filter tank. The feed pipe extends into the drum through the trunnion at the closed end of drum, although the feed




*Sectional elevation of new vacuum filter*

may enter through either end as desired. The cake is discharged from each panel in turn by pulsating air admitted between the cloth and the shell by a special valve which is driven from the filter countershaft. The filter cake drops into a hopper inside the drum and is removed by a screw conveyor.

A trunnion bearing supports the filter at the closed end, while the drum is supported near the open end by a trundle bearing the tire, being secured to the shell and the rollers mounted on the main filter baseplate. The drum is rotated by means of a worm and worm gear drive and turns in a clockwise direction. The filter is furnished with direct motor drive or is arranged for belt drive from a line shaft.

## New Shovel-Crane

THE "American Gopher," a new shovel-crane, has been recently brought out by the American Hoist and Derrick Co., St. Paul, Minn. The machine is equipped with flat continuous chain treads to which cleats may be applied for travel over slippery places. High pressure lubrication, S. K. F. bearings and a large number of interchangeable parts are some of the features stressed by the manufacturers for this new machine. The power unit is either a gasoline or Diesel engine or an electric motor, as desired.

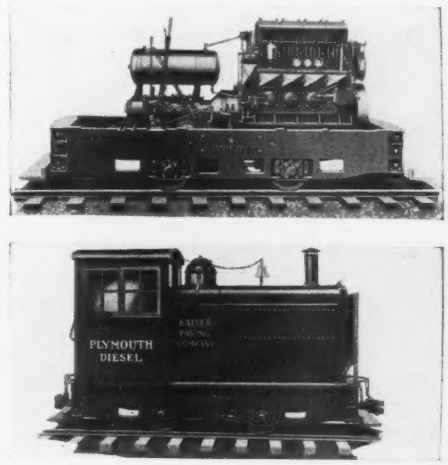
*Diesel-powered shovel-crane*

## New 10-Ton Diesel Locomotive

WHAT is claimed to be the first Diesel-powered, gear-driven locomotive built in America has just been brought out by the Plymouth Locomotive Works (the Fate-Root-Heath Co.), Plymouth, Ohio.

The power plant is a 4-cylinder, 4-cycle, enclosed type Atlas-Imperial full Diesel engine, 6½x8½ in., developing 77 hp. at a speed of 650 r.p.m. Starting is accomplished by compresed air, and a small combined gas engine and compressor is fitted in the cab for providing starting air. This unit is used for emergency only. The engine has built into it an air compressor that normally supplies all the air necessary for keeping the starting tanks filled.

The transmission follows the standard practice of the Plymouth locomotives, with sliding change gears that give four speeds




*New 10-ton Diesel locomotive*

forward and four reverse. A "Twindisc" clutch is mounted on the front end of the transmission, driven from a driving disc mounted on the engine crankshaft. The final drive from transmission to driving axles is by means of two short hardened-steel roller chains.

A heavy cast-steel frame forms the structure upon which the engine, transmission, cab, etc., are mounted. The side frame members also form the truck frame, having suitable provision for mounting the roller bearing axle boxes.

A Modine sectional radiator and a 30-in., 8-bladed fan driven from the engine provide the necessary cooling. The braking is accomplished by means of hand-operated levers, although provision is made for the application of air brakes when required.

The weight of the locomotive ready for the rails is 20,000 lb., said to come on the wheels all of which are drivers. This is claimed to give a drawbar pull of 5000 lb. on dry rails at 2½ miles per hour. Additional speeds of 4, 8¼ and 13½ miles per hour are provided.

The new Diesel locomotives will be made in a full range of sizes from 10-ton up to 50-ton, and the larger sizes will soon be in production.

# Cost Analysis, Sand Dredge Operation*

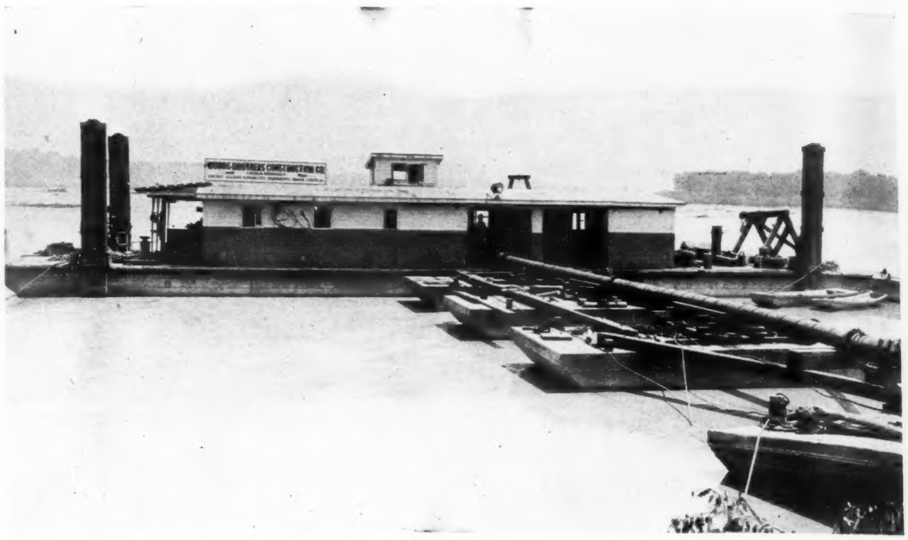
## Result of Survey of the Pump Boat of Woods Bros. Construction Co., Kansas City, Mo.

THE experience of Woods Bros. Construction Co. of Kansas City, Mo., in the pumping of sand was obtained under conditions which might be called average for plants in the United States, employing dredge pumps on sand alone. The operation began as a contract for filling low ground and was turned into commercial sand and gravel production after the dredge had been in operation for some time and hence the results are those of settled and regular conditions.

The dredge hull is 100 ft. long and 24 ft. wide. The pump is a 12-in. Type H "Amsco," made by the American Manganese Steel Co. It is belt driven by a 250-hp. variable speed induction motor taking current at 440 v. from a transformer substation on shore. The motor runs at 580 r.p.m. and with a 26-in. drive pulley and 32-in. driven pulley the pump makes 470 r.p.m. The suction is 50 ft. long enabling digging up to 42 ft. (although 35 ft. is the average depth) and the pump is of the right-hand bottom discharge design.

The discharge of the pump goes into a concrete sump 7 ft. long, 30 ft. wide and 3 ft. deep. A flume takes the overflow from this and thus disposes of excess water, clay and sand too fine to be included in the plant product. The line from the dredge to the sump is 860 ft. long and the lift is 16 ft.

A 10-in. "Amsco" pump, of the same type as the dredge pump, lifts the sand from the sump to the simple washing plant, which has screens and a "tipple," or collecting bin, from which the sand is usually loaded into cars. When cars are not available the sand is chuted into a stockpile from which it is loaded out by a locomotive crane.



***Woods Bros. Co.'s dredge on the Missouri river near Kansas City***

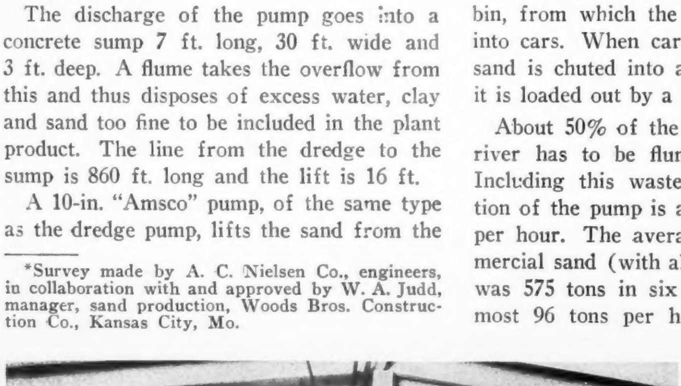
About 50% of the solids drawn from the river has to be flumed to waste as fines. Including this waste material, the production of the pump is about 190 tons of solids per hour. The average production of commercial sand (with all the fines washed out) was 575 tons in six hours' pumping or almost 96 tons per hour, and this was the average for two months of the 1926 season. The sand produced has the following screen analysis:

| | Per cent |
|---|---|
| Passing 100 mesh | 3.4 |
| Passing 48 mesh | 13.8 |
| Passing 28 mesh | 30.0 |
| Passing 14 mesh | 28.3 |
| Passing 8 mesh | 15.3 |
| Passing 4 mesh | 7.7 |
| Passing ⅜-inch | 1.5 |

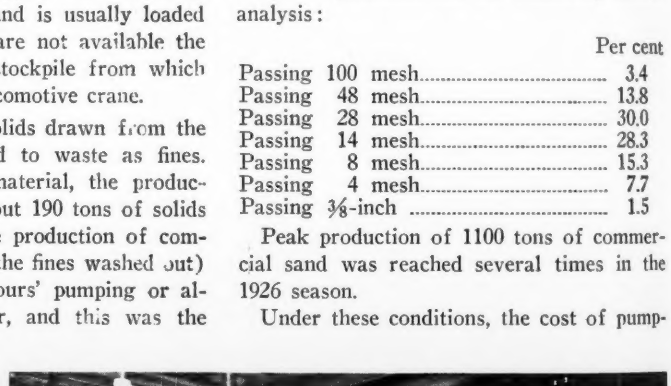
Peak production of 1100 tons of commercial sand was reached several times in the 1926 season.

Under these conditions, the cost of pump-

*Survey made by A. C. Nielsen Co., engineers, in collaboration with and approved by W. A. Judd, manager, sand production, Woods Bros. Construction Co., Kansas City, Mo.



***The 12-in. belt-driven pump, the work of which was surveyed***



***The 10-in. pump that lifts the 12-in. pump discharge from the sump***

ing per ton of commercial sand produced has been found to be $0.062 as is shown in the accompanying table.

The wear on the various parts of the dredge pump has been:

Shaft, 24 months. This was made possible by building up, annealing and re-turning every four months, a spare shaft being kept on hand for that reason.

Liners, 8 months; no attention required.

Impeller, 24 months; no attention required.

Shell, 48 months. There was no apparent wear on the shell at the end of this period.

Routine maintenance on this pump has been very simple, as only 15 min. per day is required to oil and inspect the pump. About 6 gal. of oil are used per season. The gland has to be packed twice a week (requiring 28 lb. of packing for the average season and 1½ hr. labor per week) as the pump is not equipped with high pressure water protection for the gland. The 10-in. pump is supplied with this protection and the packing lasts about eight times as long.

In figuring the cost of operation, depreciation and interest were based on a 10-year life for the unit as a whole. Cost of replacement parts was figured on their respective wearing lives as given above. The annual repair and replacement allowance of $170 is ample to cover machine shop work and work on the river in maintaining shafts.

Total fixed costs of $1,275.95 divided by 215, the number of days of operation, gives $5.93 as the fixed cost per day. Packing, oil, maintenance, labor and power have to be added to this. Power, the largest item in the cost summary, was determined from meter readings made during average operating conditions during six hours of actual operation.

Including all operations, the actual cost for six hours of actual pumping is $35.61.

***Pump Costs for Sand Dredging with 12-In. Type H Amsco Pump***

| | | |
|---|---|---|
| **Conditions:** | | |
| Belt driven by 250-hp. motor at 470 r.p.m. | | |
| 12-in. pipe line, 860 ft. long, from dredge to sump. | | |
| 50-ft. suction line; total lift, 16 ft. | | |
| **Annual Fixed Charges:** | | |
| Depreciation (on first cost plus installation) $3650÷10-year life | | $ 365.00 |
| *Average interest of 6%, 11-10x$3650x0.06½ | | 120.45 |
| Repairs and replacements: | | |
| Labor, estimated | $170.00 | |
| Parts | | |
| Shell $610, 4-year life | 152.50 | |
| Liners, 3 sets at $186, 2-year life | 279.00 | |
| Shaft, $198, 2-year life | 99.00 | |
| Impeller, $180, 2-year life | 90.00 | 790.50 |
| Total annual fixed charges | | $1,275.95 |
| **Daily Operating Costs:** | | |
| Daily fixed charge, $1,275.95÷215 days | | $ 5.93 |
| Maintenance: | | |
| Packing. Material 28 lb. @ $0.50÷215 days | | .07 |
| Labor, 1.5 hr. a wk. @ $0.40÷7 days | | .09 |
| Lubrication. Oil, 6 gal. @ $0.70÷215 days | | .02 |
| Labor, ¼ hr. @ $0.40 | | .10 |
| Power, 196 kw.x6 hr. @ $0.025 | | 29.40 |
| Total daily operating cost (10 hr.) | | $35.61 |
| **Unit Pumping Cost:†** | | |
| $35.61 a day÷575 tons per day (average) | | $0.062 |

*Allowing for interest earned by depreciation reserves.

†Not including plant overhead and general labor.

## Notes on Dredge Operation

W. E. BROWN, engineer in charge of dredging, Toronto Harbor Commission, writes in *Engineering and Contracting* of the use of various types of dredges in harbor deepening and similar work. Much of the article has to do with the problems of placing spoil and the like, which does not interest sand and gravel producers. But a part of it, relating especially to the operation of the dredge, is of interest, as showing the differences between contractors' and producers' operations.

Mr. Brown classifies the materials to be dredged and the different types of dredges used in them as follows:

Mud—Hydraulic, grapple, dipper, ladder.
Mud and Sand—Hydraulic, grapple, dipper, ladder.
Coarse Sand—Hydraulic, ladder, dipper, grapple.
Fine Sand—Hydraulic, dipper, ladder, grapple.
Sand and Gravel—Dipper, ladder, hydraulic, grapple.
Gravel—Ladder, dipper, grapple, hydraulic.
Stiff Clay—Dipper, ladder, hydraulic, grapple.
Indurated Clay—Ladder, dipper.

It will be noted that all forms of dredge are used in excavating sand and gravel in contractors' work as well as in commercial production. He says that:

It will be noticed from the above that the hydraulic is the most popular type of dredge, and the dipper probably comes a close second.

Combinations of these types may, however, be used to great advantage, especially the dipper dredge which loads into scows, and they in turn are unloaded by a stationary type of hydraulic dredge and discharged through a pipe line to suitable disposal grounds.

In general, wherever dipper or ladder dredges are employed in producing sand and gravel it has been found cheaper to tow barges rather than to pump the material from them as Mr. Brown suggests.

### *Hydraulic Dredges*

Regarding the operation of hydraulic dredges, Mr. Brown notes:

Hydraulic dredges require sufficient depth for themselves as well as for a considerable portion of their pontoon line so as to give the dredge the necessary freedom of action, but as only 3 ft. to 4 ft. is necessary for a 24-in. machine, the dredge itself is nearly always the governing feature.

The height of bank above water at the dredging face does not present any difficulty provided it is dealt with properly. The bank may slide into the water as the dredge advances, or if it has a vertical face it may break down periodically in sufficiently large quantities to form a serious menace to the plant. In the case of the Chippawa Canal the face was 32 ft. high, and had to be drilled and blasted daily to avoid serious slides which at the start of the work had caused considerable damage.

### *Booster Pumps*

The advantages and disadvantages of using booster pumps in dredging are well explained in the following paragraphs:

The grade or distance of a deposit area may be such as to warrant the use of a booster pump in the line in order to relieve the dredge of excessive discharge pressure. Booster pumps are placed in the line with by-pass valves so that they may be brought into action only when required. The chief difficulty with this work is due to the fact that the operation of a hydraulic dredge cannot be carried on continuously and, if the suction gets blocked, violent surging may be set up in the line, which may, on reaching the booster pump, suddenly relieve it of its load with serious consequences. Then, again, suppose that booster is stopped, pending resumption of operations, which may take place in anywhere from 5 to 30 minutes, the line beyond the booster may be fully loaded and, as usually happens, the heavy material settles in the pipe mostly at the low points and forms effective plugs.

On the Panama Canal, where they had two booster pumps set up in compound in order to raise discharge over 100-ft. bank, an ingenious arrangement was designed so that the booster pumps, which were on a floating scow close to dredge pontoon line, would automatically pick up the canal water if the dredge discharge dropped below a certain predetermined pressure. In other words, should the dredge close down, the booster pumps would pick up and flush the line with clear water until such time as the dredge started working or a definite shut-down took place.

These booster pumps are also necessary where the discharge is such a long distance from the dredge that the output dropped below an economical point, which only reduces the carrying capacity of the pipe, also creates a condition in the discharge line likely to cause considerable trouble due to plugs forming in the line on account of the decreased velocity. We had in the power canal discharge lines 5000 ft. long, operating against a 32-ft. head, and I believe the electric dredges discharged against heads of 42 ft., but a distinct oscillation was set up in the line which periodically reduced the flow and then let go so that the lines frequently plugged or opened up at the joints.

## Atomic Hydrogen Welding Practicable

ATOMIC hydrogen welding, which was announced as a new discovery by the General Electric Co. last year, is now put into practical form and the company is selling the equipment for its use. As the hydrogen used literally burns without oxygen the torch can be used for welding oxydizable metals which could not be welded by ordinary methods.

The torch consists of a holder supporting two tungsten wire electrodes, the electric conductors connecting these electrodes to the reactor and the tubing for the hydrogen gas. Each electrode is supported inside a nozzle through which the hydrogen gas is forced out around the electrode. The combination of electrodes and nozzles is set at an angle and the distance between electrodes, or arc length, and also the flow of gas, are readily adjustable. There is no current flowing from the torch to the weld as in ordinary electric welding.

Atomic hydrogen welding is based on the fact that a stream of hydrogen gas passing through an electric arc is broken into atoms. These atoms recombine with heat.

# News of All the Industry

## Incorporations

**Tidewater Gypsum Co.**, Houston, Tex., 50,000 shares common stock.

**Schumacher-Behrendt Sand and Gravel Co.**, Utica, Mich., $25,000.

**Pittsburgh White Sand Co.**, Philadelphia, Penn., $5,000. G. S. Smith, Gwynedd Valley.

**Maloy-Riggs Sand and Gravel Co.**, Albany, N. Y., $20,000. H. J. O'Keeffe, Albany.

**Campbell Stone Co.**, Indian River, Mich., decreased capital stock from $300,000 to $200,000.

**Plastic Lime Process Co.**, Knoxville, Tenn., $100,000. William K. Hunter, and M. F. Nichols.

**Perkins Sand and Gravel Co.**, Calvert, Tex. Jess Perkins, Bryan Adams, and Jack F. Perkins.

**Raleigh Sand and Gravel Co., Inc.**, Wilmington, Del., $100,000. To deal in gravel and allied products.

**McCracken Concrete Pipe Co.**, Sanford, Fla., $100,000. M. B. Hutton, F. N. Cameron and K. B. McCracken.

**H. G. Swendsen & Co.**, Seattle, Wash., $25,000. To engage in sand and gravel business. H. G. Swendsen and W. C. Richards.

**General Mica Co.**, Penland, N. C. W. P. Deneen, Micaville; F. Bailey, Penland, and F. A. Swift, Spruce Pine.

**Marble and Limestone Development Co.**, Pueblo, Colo., $50,000. John H. Thatcher, T. H. Devine and C. H. G. Johnson.

**Hudson Valley Sand and Gravel Corp.**, New York City, N. Y. J. M. Klein, 2 Lafayette St., New York City, N. Y.

**Wise Granite and Construction Co.**, Richmond, Va., increased capital stock from $150,000 to $200,000. Thomas Gresham is president of the company.

**P. P. Oglesby & Son, Inc.**, Wilmington, Del., $100,000. To deal in granite, marble, cement, etc. Franklin L. Metter, F. M. Gilkey, both of Wilmington, Del.

**Ellett Lime Co., Inc.**, Roanoke, Va., $25,000. To produce lime, crushed stone, etc. G. R. Hash, 408 Day Ave.; Paul G. Hash and M. J. Patsel of 379 Allison Ave.

**El Paso Rock and Gravel Co.**, Sacramento, Calif., $500,000 divided into 500 shares of $100 par value. S. H. Jones, L. M. Roberts and M. M. Albee, directors.

**Indianapolis Sand and Gravel Co.**, Indianapolis, Ind., $15,000. To produce and deal in sand and gravel. C. O. Dodson, Minnie T. Dodson, Otho F. Calvin and Eliza J. Calvin.

**Carolina Concrete Pipe Co.**, Charlotte, N. C., $250,000. To manufacture concrete products. S. H. Clark, Lilesville, N. C.; C. P. Stewart, Rockingham, N. C., and B. V. Hedrick, Salisbury, N. C.

**Florida Crushed Stone Co.**, Tampa, Fla., $100,000 divided into 1,000 shares, each of $100 par value. Jack Camp, E. F. Fitch, Frank Drake, J. E. Ballenger and W. P. McDonald, board of directors.

**Monarch Brick and Cement Co.**, Martinsburg, W. Va., $250,000. F. Vernon Aler and associates. To establish plant on Charles Town Rd.; Norman S. Sprague, consulting engineer, 6372 Jackson St., Pittsburgh, Penn.

**Great Northern Stone Co.**, Sandusky, Ohio, $500,000. To take over and operate the property formerly controlled by the Lake Shore Products Co. J. H. Cassell, Oscar J. Horn and C. E. Weissel of Cleveland, Ohio.

**Marietta Concrete Corporation**, Marietta, Ohio, $200,000. To take over, enlarge and operate the plant of the Marietta Silo Co. at Westview and to engage in the manufacture of cement building blocks and the production of art stone trim for trimming and facing all sorts of building. F. L. Christy, H. E. Goddard and F. J. McCauley.

**Osage Gravel Co.**, an Illinois corporation, has filed articles of incorporation at Indianapolis to permit them to do business in Indiana. The company will produce, manufacture and sell sand, gravel brick, stone and cement. An office has been established with C. B. Kessinger, Indiana agent, R. R. No. 4, Vincennes, Knox county, in charge.

## Quarries

**Mono Travertine Co.**, Bridgeport, Calif., has been organized by D. E. Sullivan and others of Los Angeles to work travertine deposits in Mono county, Calif.

**John T. Dyer Quarries Co.**, Norristown, Penn., has moved its offices from 207 De Kalb St., which property they have occupied for the last 30 years, into new quarters in the Norristown-Penn Trust Co. building.

**Colorado Lime Corp.**, Denver, Colo., has closed its quarry at Calcite on account of lack of limerock, according to local newspaper reports. The company owns another quarry at Wellsville which may be opened later.

**Centerville Limestone Co.**, Centerville, Ohio, are making improvements at their plant and quarry, including the installation of a new pump and compressor house and a new stone building for shop, storeroom, locomotive and car repair purposes.

**Milroy, Ind.** Motors of 30 and 15 hp. are being installed at the McCorkle stone crusher, located on Little Flatrock, south of Milroy. The crusher will be operated all winter, and three-phase, 220-volt electricity will be supplied by the Milroy Light and Power Co.

**Oregon Lime Products Co.**, Falls City, Ore., is preparing to commence operations at the Muck quarry near Falls City. A new plant is being constructed and a railroad spur is being built to the quarry. The estimated capacity of the plant will be 300 tons of pulverized limestone per day.

**Uvalde Rock Asphalt Co.**, Houston, Tex., has leased three city blocks at Dowling and Walker streets from the Missouri Pacific railway, on which it will erect a new building and make improvements at an expenditure of about $25,000. Work on the new building has already begun and if present plans materialize the structure will be completed in thirty days.

**Indiana Limestone Co.**, Bedford, Ind., held a meeting of its board of directors and district sales managers on October 4 to talk over business conditions. Lawrence H. Whiting, chairman of the board, said the Limestone company has so far for the calendar year 1927 broken all existing records in its quarry, mill production and shipments. From December 1, 1926, to date it has shipped more than 8,000,000 ft. of stone, which breaks all former records. The company has unfilled orders on hand in excess of 2,000,000 ft. This is nine months of capacity mill production of approximately 11,000 ft. a day. Mr. Whiting said the mills will be run at capacity until the middle of July, 1928, even if no new orders are obtained.

## Sand and Gravel

**Shelton Sand and Gravel Co.**, Shelton, Wash., has been sold by Wm. Gaul to J. W. Curtain of Montesana, Wash.

**Lawrenceville, Ill.** R. J. Gray has purchased the Kinder gravel bank and lands surrounding it. Mr. Gray is already operating the gravel pit adjacent to the Kinder pit.

**Pioneer Sand and Gravel Co.**, Seattle, Wash., will move into their new two-story building at Ninth Ave. and Harrison St. from present quarters in the Leary Bldg. on November 1.

**John Guyer Sand and Gravel Co.**, Santa Cruz, Calif., recently launched a new barge to operate in the San Lorenzo river, which is equipped with a pump with capacity of 60 yd. of sand and gravel per hour. The company also plans to equip a machine shop for the maintenance of a fleet of ten motor trucks.

**South Shore Coal and Building Material Co.** has purchased a large waterfront tract of land alongside the Arthur Kill channel at Tottenville, Staten Island, N. Y., and will erect a sand and gravel plant and central distributing station. According to reports the company also intends to expend about $100,000 in rebuilding the existing dock.

**Princeton, Ill.** Robert L. Schoenberger, county superintendent of highways, has entered into an agreement, covering a period of five years, with Tom Mountain of Indiantown township, whereby the county highway department is to have the privilege of taking gravel and other road building material from his pit at the rate of 15 cents per sq. yd.

**Normal, Ill.** A second gravel pit has been opened in Normal township, directly south of the first pit opened here several weeks ago on the Kletz grounds. Indications are that the newly discovered supply of gravel is even greater and of a better grade in other parts of the field than that in which the first pit was excavated, from which 2300 yd. of gravel was taken for use in graveling Sudduth road.

**Hanover, Kans.** It is reported that John Westover, Lincoln, Neb., who recently purchased 20 acres of gravel land just west of Hanover from John Schuette, has leased 40 acres of gravel land from H. W. Meyer south of the land recently purchased and also leased part of the big gravel deposits just west of the Little Blue river. Up to the present time a number of tests have been made of the gravel in the first acquisition of land, and they have proven very satisfactory.

**Greenville Gravel Corp.**, Greenville, Ohio, is reported to have leased a new deposit of sand, gravel and stone on the Edward W. Hodge and Samuel Hodge farms in Goshen township, south of Mechanicsburg, for ten years. The lease gives the company the right to remove sand, gravel and stone from either farm upon the payment of a royalty equal to a cent a ton. According to the report, the agreement is that the company will remove at least 50,000 tons a year for the first three years and 100,000 tons a year after that during the life of the lease, with the privilege of abandoning the land if the materials expected are not found in sufficient quantities to justify the continuance of operation.

## Silica Sand

**Early County, Ga.** Tests are now being made of a glass sand deposit in Early county near Blakely, which is claimed to be the only such deposit of consequence in the state. J. M. Mallory, general industrial agent of the Central of Georgia railway, has returned from an investigation of the deposit and believes it to be of high quality.

## Cement

**Pacific Portland Cement Co.**, San Francisco, Calif., has moved its offices to 111 Sutter St.

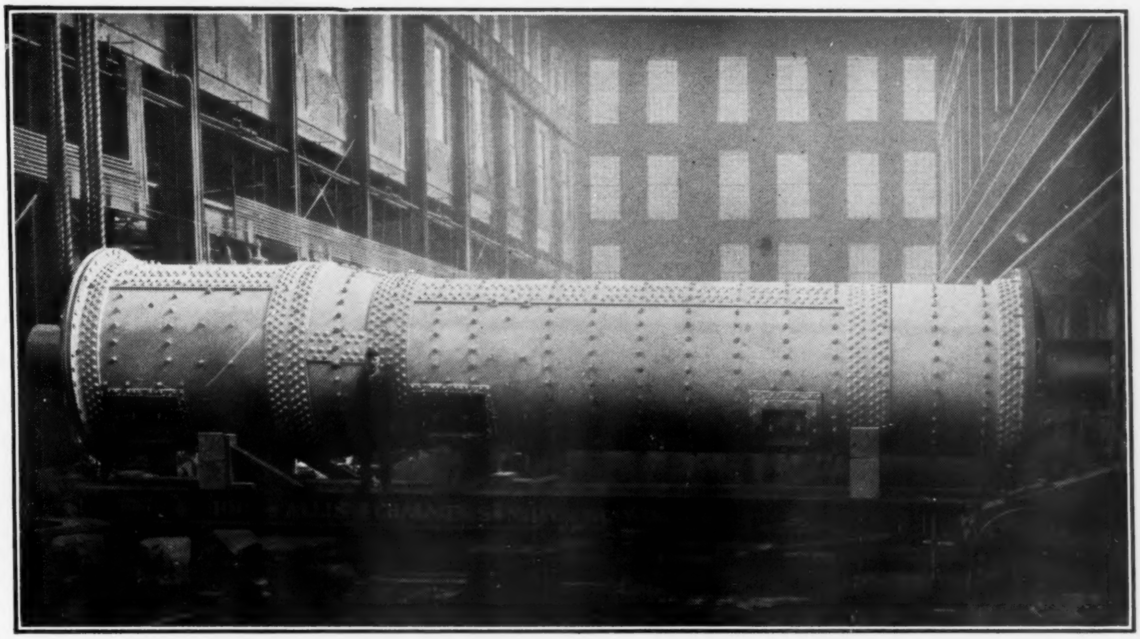
**Peerless Portland Cement Co.**, Detroit, Mich., has awarded contract to the MacDonald Engineering Co., Chicago, Ill., for the construction of six silos, 50 ft. in diameter and 80 ft. high, for storage of bulk cement on West Jefferson Ave., Detroit.

**Ideal Cement Co.**, Denver, Colo., has closed a contract with the Colorado-Wyoming Gas Co. for natural gas to its new cement plant just outside of Fort Collins, Colo. The plant will use between 5,000,000 and 6,000,000 cu. ft. of gas daily. Operation is expected to begin about November 15.

**Virginia Portland Cement Corp.**, Norfolk, Va., a subsidiary of the International Cement Corp., New York City, is constructing six additional storage silos at its plant in South Norfolk. The circular silos, of reinforced concrete construction, will be 32x80 ft. each, and have a combined capacity of 100,000 bbl. MacDonald Engineering Co., Baltimore, Md., is in charge of the new construction work.

## Cement Products

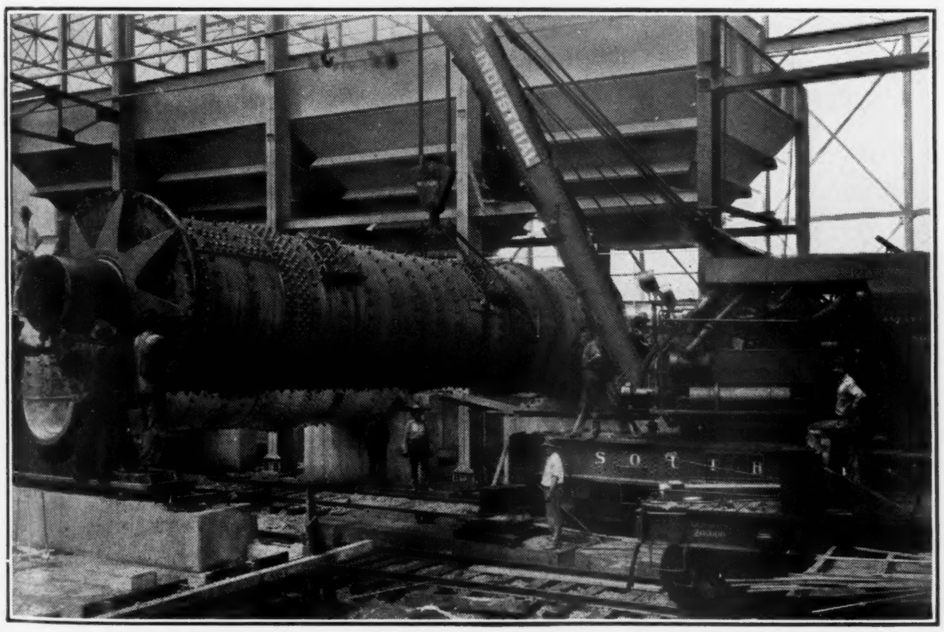
**W. T. Lange & Co.**, Bellingham, Wash., according to newspaper reports, will begin operations at once to manufacture Shope patented concrete brick. The brick will be turned out at the



No. 8740 Clinker Compeb Mill loaded on special car in our shop.

# Manufacturing Facilities *Only* Will Permit This

All Allis-Chalmers Compeb Mills for domestic shipment are assembled complete in our shops as represented by these photographs. All linings for interior of mill installed, shell linings being backed up with zinc. Heads attached. This method of shipment assures purchaser of accuracy and eliminates field expense of assembling.



No. 8740 Clinker Compeb Mill being unloaded from car and placed directly on foundations in customer's plant.

# ALLIS-CHALMERS

**MILWAUKEE, WIS. U.S.A.**

rate of 8000 a day and this will be increased to 16,000 when two more machines are installed.

**C. J. Mattlin,** White Bear, Minn., has bought the cement block business of J. R. Palmer of White Bear.

**Cast Stone Co.,** Columbus, Ohio, is planning the erection of a new plant. H. W. Price, 1859 North Grant St., is president of the company.

**Portland Cast Stone Co.,** Portland, Ore., has commenced operations at 1314 Union Ave., Portland. George R. Davidson is owner of the company.

**Beverett Automatic Sealing Vault Co.,** Troy, Ala., is reported planning to construct a plant on South Brundige St. in Troy for the manufacture of burial vaults, flower vases and other cement products. A. L. Beverett is manager.

**Chicago Panelstone Co.,** Chicago, Ill., a subsidiary of the National Panelstone Co., producers of synthetic marble and tile, has leased a one-story manufacturing building at Campbell and George Sts. for 10 years, with an option to buy within three years. The company has a plant at 419 West Superior St., where laboratories will be maintained, as well as a permanent exhibit in the Builders Bldg. The company was recently incorporated for $25,000.

## Lime

**Berkshire Hills Lime Co.,** Sheffield, Conn., is erecting a large building north of its present warehouse on the New Haven railroad tracks.

**East Sound (Orcas Island), Wash.** It is reported that the lime plant and property of the American Smelting and Refining Co., located on the north side of East Sound, has been sold to eastern people for $30,000. The property has been lying idle for about 10 years, but it is expected that the new owners will have a good sized plant in operation shortly.

## Gypsum

**United States Gypsum Co.,** Chicago, Ill., is reported to have preliminary plans for a new mill on the River Rouge, near Dearborn, Mich.

## Agricultural Limestone

**Janesville, Wis.** Rock County Farm Bureau has sold one of its four limestone crushers, purchased several years ago for supplying lime to its members, to Fred Risch of Janesville. The crusher will be used in the quarry on his farm, four miles west of the city, where he has orders for several hundred tons of lime for those in the neighborhood. The Farm Bureau is now operating three crushers and turning out hundreds of tons of crushed rock for application to land every summer.

**Moberly, Mo.** The board of directors of the Randolph County Farm Bureau met here recently to discuss the question of providing sources of agricultural limestone at all shipping points in the county. There are many farmers who would like to use lime but who are not in a position to handle it in carload lots. Naturally the limestone would cost more in smaller lots, because the individual or organization who stocked it would be put to some expense in providing storage. but it was the unanimous opinion of the board that the stocking of lime at all shipping points would be a service of far-reaching value to the farmers of the county. A committee was appointed to begin work on the project.

## Miscellaneous Rock Products

**American Magnesium Co.,** Los Angeles, Calif., is developing maximum production at its new plant at Wilmington, on Los Angeles Harbor. The company has a large deposit at Magnesium, San Bernardino county, and is producing 15 tons of magnesite per day for use at the refining plant, where the raw material is being converted into such basic products as epsom salts, magnesium carbonate, light precipitates and glauber salts.

**Kobold Corp.,** agent for "Zonolite" (vermiculite), a form of mica mined in the Kootenai Valley of northwestern Montana, and described in ROCK PRODUCTS of June 26, 1926, has leased space and established general distribution offices in the Westland Warehouses, Los Angeles, Calif. Zonolite is now being marketed for use as insulating material, for refractory purposes, for fireproof roofing material, as a filtering material for oils and as a substitute for ground mica in various capacities.

**Ganim Mining Co.** Notwithstanding the fire of September 26, which destroyed the works at the Ganim mine, two miles west of Whiskey Town, near Redding, Calif., mining for talc will be resumed here very shortly, according to local newspaper reports. The company has decided to proceed immediately with the building of a mill to replace the one destroyed and to raise funds for construction an assessment of 5 cents a share has been levied on the stock of the company.

## Personals

**Joseph Scobell,** treasurer and general manager of the Erie Sand and Gravel Co., Erie, Penn., has suffered a stroke of paralysis and is reported to be seriously ill at his home.

**J. V. N. Dorr,** of the Dorr Co., engineers, New York, N. Y., has returned from three months spent in Europe, where he has been conferring with business associates in the industrial centers of England and the Continent.

**John D. Grothe,** technical director of the Societe Dorr et Cie of Paris, France, arrived in New York on October 18. He will spend several months studying the progress made in engineering since his last visit to this country five years ago.

**A. L. Curtis,** Westmoor Laboratory, Chatteris, Cambridgeshire, England, has recently been awarded the Carnegie Gold Medal for the year 1915 by the council of the Iron and Steel Institute in recognition of his research work on molding sands.

**J. I. McCants,** of Augusta, Ga., has been made sales manager of the Georgia Portland Cement Co. at Augusta. The Georgia Portland is a recently formed company which will manufacture quick-hardening cement. Mr. Cants is now assisting with the organization of the forces of the company and will take charge of the sales work as soon as production is started.

*R. W. Gillispie*

**Robert W. Gillispie,** formerly vice-president and assistant general manager of the Jeffrey Manufacturing Co., Columbus, Ohio, has been elected vice-president and general manager of the company. Mr. Gillispie joined the Jeffrey organization in 1926, previous to that time having been connected with the Bethlehem Steel Company in an executive capacity for a number of years.

**J. B. Zahn,** secretary of the United States Portland Cement Co., Denver, Colo., and vice-president of the Denver Chamber of Commerce, was elected chairman of a committee to look into the advisability of placing the control of all the state highways in the hands of the state highway commission in place of leaving them under the control of the county commissioners, as they are at the present time.

## Obituaries

**Francis Winthrop Taylor,** vice-president of the S. G. Taylor Chain Co., Chicago, Ill., died on October 9, after a long illness.

**J. C. Dennison,** pioneer dealer in sand and gravel and a civil war veteran, died at his home in Chicago on October 7th. He was 88 years old.

**William H. Matthews, Jr.,** Cleveland district sales manager of the Universal Portland Cement Co., died October 16. He was 46 years old and had been connected with the Cleveland office of the Universal company since 1910.

**Redmond S. Colnon,** a director of the Missouri Portland Cement Co., died at his home in St. Louis on Oct. 9 at the age of 65. Mr. Colnon was a graduate of the engineering school of Cornell University, and at the time of his death he was the active head of the Fruin-Colnon Contracting Co. of St. Louis. In addition to being a director in the Missouri Portland Cement Co. he was also a director in the MerchantsLaclede National Bank, the Scullin Steel Co., and the St. Louis Frog & Switch Co.

## Manufacturers

**Bates Valve Bag Corp.,** Chicago, Ill., has moved its executive offices to Suite 2700, 35 East Wacker Drive, Chicago.

**Robert W. Hunt Co.,** Engineers, Chicago, announce the removal of their Birmingham, Ala., office to the Bankers Bond Building, in Birmingham.

**Brown Instrument Co.,** Philadelphia, Pa., has opened a branch office at 509 Mutual Bldg., Kansas City, Mo., in charge of F. M. Poole, District Manager.

**Chicago Pneumatic Tool Co.,** New York City, will move its Cleveland district sales office on November 1st from 1241 East 49th St. to 1727 Union Trust Bldg., Cleveland, Ohio.

**Davenport Locomotive Works,** Davenport, Iowa, has reorganized. The manufacturing plant and entire business has been acquired and will hereafter be conducted by the Davenport Locomotive and Manufacturing Corporation.

**Rollway Bearing Company, Inc.,** Syracuse, N. Y., has opened a new sales office at 956 Leader Building, Cleveland, Ohio. R. D. Faris has been appointed Cleveland district representative, with headquarters at this address.

**Lincoln Electric Co.,** Cleveland, Ohio, has appointed E. A. Thornwell of Atlanta, Ga., as their representative for Georgia and Eastern Tennessee. John Van Horn, factory engineer for the company, has been attached to the Atlanta office to assist Mr. Thornwell.

**Chain Belt Co.,** Milwaukee, Wis., has purchased the mortar and plaster mixer business of the Atlas Engineering Co., thereby adding a complete line of mortar and plaster mixers to the Rex line of concrete mixers. This is the second manufacturing business the company has bought within a year, the Stearns Conveyor Co., Cleveland, Ohio, manufacturers of belt conveyors, being taken over about eleven months ago.

**American Manganese Steel Co.,** Chicago, Heights, Ill., has purchased the iron foundry of the American Brake Shoe and Foundry Co. at Burnside on the South Side of Chicago, and will establish their seventh manufacturing unit there for AMSCO manganese steel castings. The date set for the Burnside plant to begin operations under AMSCO management is January 1st, 1928, and the company is now engaged in re-arranging and equipping part of the plant.

**Foote Bros. Gear & Machine Co.,** Chicago, Ill., has acquired the plant and business of the A. Plamondon Manufacturing Co., also of Chicago, which consumates a merging of two pioneer industrial firms manufacturing gearing and power transmission machinery. The Foote company has specialized in all kinds of gearing, special machinery, and speed reducers of all types, while the Plamondon company specializes in large sizes and machine moulded gears, and produces a complete line of transmission equipment. They also do a large business on heavy special machinery built to order. The Plamondon plant will continue to be operated as in the past, the personnel of the old organization being retained, and Foote Bros. will also be able to offer a more complete service on transmission equipment through the additional lines acquired.

## Trade Literature

*NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention* ROCK PRODUCTS.

**G-E Bulletins.** GEA-233A on single-stage centrifugal air compressors. GEA-152A on type AW auxiliary welding resistors (200-500 Amperes 60 Volts) for metallic welding only. GENERAL ELECTRIC CO., Schenectady, N. Y.

**Portable Air Compressors.** Bulletin No. 200-A, describing the new line of Gardner-Denver portable gasoline engine driven air compressors. Construction details, operation data, specifications, etc. GARDNER-DENVER COMPANY. Denver, Colo.

**Explosives.** Anniversay Number of the Du Pont Magazine, giving interesting facts on the history of explosives, and the development and growth of E. I. du Pont de Nemours & Co. over a period of 125 years. E. I. DU PONT DE NEMOURS & COMPANY, Inc., Wilmington, Del.

**Power Shovels.** Bulletin No. 6—Illustrated engineering, sales and service manual covering entire line of Wilford units, and giving technical specifications, operation, maintenance and lubrication data, as well as typical installations, of the Wilford power shovel. UNIVERSAL POWER SHOVEL CO., Detroit, Mich.